

# **EXHIBIT 7**

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**IN THE UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF CALIFORNIA  
OAKLAND DIVISION**

JEFF YOUNG, individually and on behalf of all  
others similarly situated,

Plaintiff,

v.

CREE Inc.,

Defendant.

Civil Action No. 4:17-cv-06252-YGR

**EXPERT REBUTTAL REPORT OF JOEL H. STECKEL, PH.D.**

**March 22, 2019**

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## I. INTRODUCTION

### A. Qualifications

1. I am a Professor of Marketing and the Vice Dean for Doctoral Education at the Leonard N. Stern School of Business, New York University, where I have taught since January 1989. I was the Chairperson of the Marketing Department for six years, from July 1998 to June 2004. Since August 2016 I have been serving as the Acting Chairperson of the school's Accounting Department. Prior to my promotion to Vice Dean, I was the faculty director of the Stern School Doctoral Program for five years, from May 2007 to July 2012. I have also held either permanent or visiting faculty appointments at the Graduate School of Business, Columbia University; the Anderson Graduate School of Management, U.C.L.A.; the School of Management, Yale University; and the Wharton School, University of Pennsylvania. I received my B.A. *summa cum laude* from Columbia University in 1977, and M.B.A., M.A., and Ph.D. degrees from the Wharton School, University of Pennsylvania in 1979, 1980, and 1982, respectively. I was elected to Phi Beta Kappa at Columbia University and Beta Gamma Sigma at the Wharton School. These are the national honor societies for the respective disciplines I studied at these institutions.
2. I was the Founding President of the INFORMS (Institute for Operations Research and Management Science) Society on Marketing Science, the foremost professional group for the development and application of management science theory and tools in marketing. In addition, I am a member of the American Marketing Association, the American Statistical Association, the Association for Consumer Research, the American Psychological Association, the American Association for Public Opinion Research, and the Society for Consumer Psychology.

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3. My fields of specialization within marketing include marketing research methodology such as conjoint survey design and analysis, marketing and branding strategies, electronic commerce, managerial decision-making, and consumer decision-making. I am an author of four books and over 50 articles. In the course of my scholarly research, teaching, and consulting work, I have studied issues of marketing research, branding, and their roles in consumer choice and marketing strategy.
4. One of the books I co-authored is a textbook entitled *Marketing Research*. This book has been adopted at several of the country's major business schools. During one of my sabbaticals I served as an in-house consultant at the market research firm, Directions for Decisions (DFD), headquartered in Jersey City, New Jersey. DFD's growth allowed it to be acquired by RTi Research, another research firm, headquartered in Norwalk, Connecticut.
5. I have sat on the editorial boards of many of our major journals over the years. Until last year, I served as a co-Editor-in-Chief of the journal *Marketing Letters*. In that capacity I evaluated over 200 research studies each year for six and a half years. I served as a gatekeeper, deciding what got published in the journal, and what did not. As such, my evaluations of the scientific reliability and validity of each study were subject to the scrutiny of the academic community. The community considers any study that does not conform to the scientific standards of my profession that appears in the journal as a black mark on my record. I consider the fact that the journal's publisher, the international firm, Springer-Verlag, kept me on long past the expiration of my term (July 2014) as validation of my performance in evaluating research. My professional qualifications are described further in my curriculum vitae, which is attached as **Appendix A**.

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6. During the course of my professional career, I have designed, conducted, supervised, and/or evaluated hundreds of consumer surveys including conjoint surveys. In that work I have formulated sampling strategies, designed questionnaires, analyzed data, and interpreted results. I have also evaluated similarly purposed survey work performed by others. During my career, I have taught M.B.A students about, written textbook chapters and research papers on, and lectured executives on conjoint surveys and analysis. I have also published research using and advancing the state of the art of conjoint surveys and analysis.
7. I have served as an expert witness on marketing research, marketing strategy, branding, trademark, and issues related to consumer decision-making in a variety of litigation matters. In the past four years, I testified as an expert witness in the matters listed in **Appendix B**.
8. My rate of compensation for this assignment is \$1,000 per hour. Others at Analysis Group, Inc. (“AG”), an economic and litigation consulting firm headquartered in Boston, Massachusetts, performed part of the work for this assignment under my direction. I receive additional compensation from AG related to the work of others under my supervision. No compensation is contingent upon the outcome of this research or of the case.

## **B. Background**

9. According to the Complaint in this matter, Jeff Young (“Plaintiff”) “purchased three 100 Watt Standard A-Type bulbs on or around April of 2015 from WalMart” and paid between \$15 and \$20 for each bulb.<sup>1</sup> Prior to purchasing the bulbs, Plaintiff “viewed some internet and television advertisements by Cree” and “reviewed the representations on the label which

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<sup>1</sup> Amended Class Action Complaint, *Jeff Young, individually and behalf of all others similarly situated, v. Cree Inc.*, Civil Action No. 4:17-cv-06252-YGR, United States District of California, San Francisco Division, April 30, 2018 (“Complaint”), ¶ 36.

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compared the Cree bulbs to other LED and non-LED light bulbs.”<sup>2</sup> Plaintiff seeks to represent a class defined as: “All persons in California who purchased the LED Lightbulbs during the applicable limitations period.”<sup>3</sup>

10. The Defendant, Cree, Inc. (“Cree”), is headquartered in Durham, North Carolina<sup>4</sup> and manufactures, markets, and sells various LED light bulbs, including “Standard A-Type, Reflector (Flood/Spot), and Specialty.”<sup>5</sup> According to the Complaint, Cree markets its light bulbs with packaging containing “an estimated lifetime use and energy saving” as well as “an ‘estimated’ cost savings for the purchaser buying the product, which range based on the cost of the product and the advertised lifespan for the LED lights.”<sup>6</sup> Cree also allegedly includes such marketing statements on their website as well as in several online and TV advertisements.<sup>7</sup>

11. In the Complaint, Plaintiff alleges that “[m]any of Cree’s LED bulbs are sold with packaging which indicates that the product comes with a 10 Year Warranty or ‘100% Satisfaction Guaranteed’” as well as “an estimated lifetime use and energy saving, indicating that the products will save consumers money in the long term despite their high purchase price point” and that “the useful life of the product will be at least 10 years or more.”<sup>8</sup> Plaintiff claims that Cree “created an overall marketing scheme that overpromises the longevity of the

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<sup>2</sup> Complaint, ¶ 36.

<sup>3</sup> Complaint, ¶ 38.

<sup>4</sup> Complaint, ¶ 14.

<sup>5</sup> Complaint, ¶ 20.

<sup>6</sup> Complaint, ¶¶ 17, 28.

<sup>7</sup> Complaint, ¶¶ 22, 32.

<sup>8</sup> Complaint, ¶ 17. Plaintiff also notes that “Cree packaging boasts that their products have life of ‘27+ years’ or more depending on the bulb.” Complaint, ¶ 18.



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Lightbulbs”<sup>9</sup> and that the “longevity representations (i.e. 27+ years), taken in conjunction with the marketing and advertising of the Lightbulbs detailed herein, signals to the consumer that the bulbs will significantly outlast traditional incandescent bulbs, when it is, in fact, not true.”<sup>10</sup> Plaintiff alleges that “LED Lightbulbs do not last nearly as long as advertised” and that “Plaintiff and members of the class paid a price premium for the Cree LED bulbs that they would not have paid absent the false marketing representations of Defendant.”<sup>11</sup> Mr. Boedeker refers to the representations of lifetime as the “Longevity Claims.”

12. Plaintiff retained Mr. Stefan Boedeker to “provide a framework for the computation of class-wide damage.” In particular, Mr. Boedeker was asked to “[e]xplain and outline an empirical study to assess consumers’ changes in choices and preferences to quantify the economic loss to consumers if they were given the information at the point of purchase that Defendant’s Longevity Claims were false and misleading” and “[e]xplain and outline a statistical methodology to calculate class-wide damages.”<sup>12</sup>

### **C. Assignment**

13. I was asked by Katten Muchin Rosenman LLP, counsel for Cree, to assess whether or not Mr. Boedeker’s survey designs, data analyses, and conclusions were conducted in a scientifically appropriate and valid manner. I was asked to consider the extent to which Mr. Boedeker’s surveys and data analyses support his conclusions that “each consumer who

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<sup>9</sup> Complaint, ¶ 19.

<sup>10</sup> Complaint, ¶ 19.

<sup>11</sup> Complaint, ¶¶ 7, 9.

<sup>12</sup> Expert Report of Stefan Boedeker In Support of Plaintiff’s Motion for Class Certification, *Jeff Young, individually and on behalf of all others similarly suited, v. Cree Inc.*, Civil Action No. 4:17-cv-06252-YGR, United States District Court, Northern District of California, San Francisco Division, January 18, 2019 (“Boedeker Report”), ¶ 14.

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bought Defendants' light bulbs with the false Longevity Claims overpaid"; that "consumers also overpaid because of the warranty claim"; and that "the method proposed and described in [his] report can be used to expand the results of the conjoint study to a complete model to calculate class-wide damages."<sup>13</sup> In addition, I was asked to determine whether his surveys provide a reliable measure of "economic loss."<sup>14</sup>

14. In formulating my opinions, I relied upon the items cited in the footnotes to this report and in **Appendix C**.

#### **D. Summary of Conclusions**

15. Based on my review of the Boedeker Report, I conclude that Mr. Boedeker's "Pre-Test" survey, conjoint survey, and data analyses suffer from severe mistakes and cannot support the measurement of "economic loss." Mr. Boedeker's methods and results cannot support the conclusion that consumers overpaid due to the longevity and warranty claims, nor can they be used to calculate class-wide damages. Specifically, I find that:

- a. Mr. Boedeker's exploratory "Pre-Test" survey is fraught with fundamental problems that yield invalid, irrelevant, and biased data. Many attributes in Mr. Boedeker's "Pre-Test" are confusing and overlapping in meaning. His "Pre-Test" questions are leading and likely encouraged respondents to guess in a manner that biases results. Further, since he conducted statistical tests that do not have adequate statistical power, Mr. Boedeker cannot conclude from his "Pre-Test" that there is no difference in preferences between Cree purchasers and purchasers of all other brands.

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<sup>13</sup> Boedeker Report, ¶¶ 172, 174.

<sup>14</sup> Boedeker Report, ¶ 171.

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- b. Mr. Boedeker's flawed and biased conjoint survey design cannot yield valid results. His conjoint choice tasks reflect an unrealistic marketplace scenario and ignore the results of his exploratory "Pre-Test." Each choice screen inflates his willingness-to-pay measurement by biasing respondents towards noting that a low light bulb lifetime can be equated with a "cheap" product. Mr. Boedeker also does not sufficiently define the comparative lifetime claim attribute and therefore has no way of knowing how respondents interpreted the attribute and its levels, particularly the level "No claim." Further, by providing respondents with the lifetime concept as two separate attributes in the choice task, Mr. Boedeker creates choice options that amplify respondents' value of lifetime in the choice tasks and allow for the choice tasks to present inconsistent attribute information. On top of these confusing factors, Mr. Boedeker presents excessively complex choice tasks that likely resulted in respondents not paying sufficient attention to each choice screen. These errors cannot be retroactively accounted for in Mr. Boedeker's data analysis.
- c. Beyond the severe design errors in his conjoint survey, Mr. Boedeker's analyses of his conjoint data are conceptually and technically flawed. His method of calculating willingness-to-pay is not an accepted practice in conjoint analysis, and he constructs what he calls "demand" curves with no consideration of actual products that exist in the marketplace. Despite discussing the concepts of both supply and demand in his theoretical framework, Mr. Boedeker does not account for supply-side dynamics in his conjoint analysis. Further, Mr. Boedeker's results

are illogical. In particular, they suggest some respondents preferred shorter lifetimes to longer ones.

- d. In designing both of his surveys, Mr. Boedeker failed to follow basic best practices for surveys for litigation, which could have allowed him to identify major design flaws.

## II. OVERVIEW OF MR. BOEDEKER'S TWO STUDIES

16. Mr. Boedeker seeks to “assess consumers’ changes in choices and preferences to quantify the economic loss to consumers.”<sup>15</sup> He presents two surveys: an exploratory study, which he refers to as a “Pre-Test” survey, and a choice-based conjoint survey.

### i. *Overview of Mr. Boedeker’s Exploratory “Pre-Test” Survey*

17. Mr. Boedeker’s first survey, which he confusingly refers to as his “Pre-Test” survey,<sup>16</sup> seeks “to understand the consumer preferences for light bulbs and the importance of certain attributes of light bulbs to consumers.”<sup>17</sup>

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<sup>15</sup> Boedeker Report, ¶ 14.

<sup>16</sup> As I will discuss in Section VI.A, Mr. Boedeker does not conduct a pretest as defined and required by survey guidelines for litigation. In her *Reference Guide on Survey Research*, Dr. Shari Diamond describes a pretest as the administration of the survey to a small sample of the target population in which “interviewers observe the respondents for any difficulties they may have with the questions and probe for the source of any such difficulties so that the questions can be rephrased if confusion or other difficulties arise.” Diamond, S.S., “Reference Guide on Survey Research,” *Reference Manual on Scientific Evidence*, 3<sup>rd</sup> Edition, National Academies Press, 2011, pp. 359-423, (“Diamond”), at p. 389. Properly conducted pretests can inform the design of the ultimate survey instrument and help identify potential flaws in the survey design. What Mr. Boedeker refers to as a “Pre-Test” is not a pretest but an exploratory study; however, for clarity and consistency with Mr. Boedeker’s terminology, I will use the term “Pre-Test” in quotation marks when referring to his exploratory study.

<sup>17</sup> Boedeker Report, ¶ 94.

18. This exploratory “Pre-Test” survey applied the following qualification criteria for respondents to participate in the study:

- “a. Respondent is 18 years or older;
- b. Respondent resides in the United States
- c. Respondent has purchased LED light bulbs or Wi-Fi enabled LED light bulbs in the past 2 years;
- d. Respondent is familiar with at least one of the LED light bulb brands listed in the survey;
- e. Respondent took the purchasing decision or was involved in the purchasing decision in at least one LED light bulb purchase in the past two years;
- f. Respondent is not working in market research.”<sup>18</sup>

In total, 500 respondents qualified for and completed the “Pre-Test” survey.<sup>19</sup>

19. After qualifying for the “Pre-Test” survey, respondents were first asked, “Which of the following attributes are important to you in your purchasing decision when shopping for an LED light bulb?” and provided a list of 25 attributes, including “Other.”<sup>20</sup> Next, for the attributes each respondent selected, Mr. Boedeker provided respondents with a constant-sum point allocation task. Specifically, he asked respondents to “allocate 100 points across the features by putting a number between 0 and 100 for each feature” (emphasis in original), with “the most points for the features [they] care about the most and the fewest points for

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<sup>18</sup> Boedeker Report, ¶ 96, footnote 41. “The listed brands are 3M, Cree, EarthLED, EcoSmart, FEIT, GE, Geobulb, Halco, IKEA, Insignia, OSRAM, Phillips, SunSun, Switch, Sylvania, TCP/TruDim, Utilitech.”

<sup>19</sup> Boedeker Report, ¶ 98.

<sup>20</sup> “LED Pre-Survey.docx.” The full list of attributes included: “Brand, Potential cost savings, Wattage, Warmth of light, Color / Light Quality, Energy Efficient & Payback, Dimming / Dimming Range / Flicker, Price / Value, Appearance, Brightness / Light Output, Heat Production, Cold Temperature / Outdoors, Dispersion / Omni, Mercury / Toxic / Disposal, Lifetime / no Maintenance, Warm-up / On Time, Buzz / Sound / Radio Frequency Interference (RFI), Warranty, Packaging, Eco / Green / Environment, Bulb coating / glass, Made / Assembled in USA, Bulb design / size / build / weight / quality, As Advertised / Meet performance expectations, Other.”

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features [they] care about the least.”<sup>21</sup> Mr. Boedeker calculated the mean point allocation for each of the provided light bulb attributes to determine the “importance scores” of each attribute.<sup>22</sup> He then compared the attribute importance scores for Cree purchasers and non-Cree purchasers, concluding that “because preferences between LED light bulb purchasers differ little by brand, I can include purchasers of all brands in a conjoint analysis.”<sup>23</sup>

ii. *Overview of Mr. Boedeker’s Choice-Based Conjoint Survey*

20. Mr. Boedeker’s second survey, a choice-based conjoint survey, was designed to “assess consumers’ changes in choices and preferences to quantify the economic loss to consumers if they were given the information at the point of purchase that Defendant’s Longevity Claims were false and misleading”<sup>24</sup> and “to calculate class-wide damages if the disclosure that Defendant’s products are not as represented at the point of purchase with regard to the Longevity Claims, which leads consumers to no longer purchase the product or to purchase the product at a reduced price.”<sup>25</sup> In other words, Mr. Boedeker used his conjoint data to calculate consumers’ “willingness-to-pay” for particular attribute levels (see Mr. Boedeker’s Section 2 of his report, “Theoretical Framework of Economic Loss”).

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<sup>21</sup> “LED Pre-Survey.docx.”

<sup>22</sup> See, for example, Boedeker Report, Table 2.

<sup>23</sup> Boedeker Report, Table 2 and ¶ 115.

<sup>24</sup> Boedeker Report, ¶ 14. The Boedeker Report characterizes Cree’s claims as *false*. However, his task did not need to make this characterization. All he needed to do was quantify the economic value of a product with the claims as stated relative to another “but-for” product. This task is independent of whether the claims are true or false. The Boedeker Report’s characterization of false messages is unnecessary, gratuitous, and revealing of potential bias.

<sup>25</sup> Boedeker Report, ¶ 14.

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21. The choice-based conjoint survey applied the following qualification criteria for respondents:

- “a. Respondents are 18 years or older;
- b. Respondents are not working in market research;
- c. Respondents have to reside within the US;
- d. Respondents have purchased LED light bulbs within the past four years (2015-2018);
- e. Respondents are familiar with at least one of the LED light bulb brands listed in the survey;
- f. Respondents took the purchasing decision or was involved in the purchasing decision in at least one LED light bulb purchase in the past four years;”<sup>26</sup>

In total, 1,000 respondents qualified for and completed the conjoint survey.<sup>27</sup>

22. Mr. Boedeker randomly assigned respondents into two groups: 500 respondents were assigned conjoint choice tasks involving 60W-equivalent LED bulbs, and 500 respondents were assigned conjoint choice tasks involving 100W-equivalent LED bulbs.<sup>28</sup> Qualified respondents were presented a hypothetical purchase scenario asking them to “Assume that you are purchasing [a 60W- or 100W-equivalent LED bulb from] your favorite brand. Please indicate which of the given options you would prefer.”<sup>29</sup> Immediately after respondents selected their preferred option in each choice task, they were asked: “Would you purchase the option you selected above?”<sup>30</sup> Each respondent then completed twelve choice tasks

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<sup>26</sup> Boedeker Report, ¶ 122, footnote 48. “The listed brands are 3M, Cree, EarthLED, EcoSmart, FEIT, GE, Geobulb, Halco, IKEA, Insignia, OSRAM, Phillips, SunSun, Switch, Sylvania, TCP/TruDim, Utilitech.”

<sup>27</sup> Boedeker Report, ¶ 119.

<sup>28</sup> Boedeker Report, ¶ 123.

<sup>29</sup> “LED Conjoint Survey.docx.”













<sup>30</sup> “LED Conjoint Survey.docx.”

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consisting of five different LED light bulbs with seven varying attributes.<sup>31</sup> An example of a choice task presented to respondents is included in Figure 1 below.

**Figure 1. Example of a Choice Task in Mr. Boedeker's Conjoint Survey<sup>32</sup>**

For a **10 Watt LED light bulb of size A19 to replace a 60 Watt incandescent bulb**, please indicate which of the given options you would select. 

	Option 1	Option 2	Option 3	Option 4	Option 5
 Indoor / Outdoor	Yes	Yes	Yes	Yes	Yes
 Dimmable	Yes	Yes	No	No	Yes
 Comparison to cheap LED light bulbs	No claim	The LED light bulb will last six times longer than cheap LED light bulbs.	The LED light bulb will last six times longer than cheap LED light bulbs.	No claim	No claim
 Lifetime	Lasts 31+ years (35,000 hours) with estimated lifetime savings of \$192.50 over incandescent bulbs.	Lasts 31+ years (35,000 hours) with estimated lifetime savings of \$192.50 over incandescent bulbs.	Lasts 22+ years (25,000 hours) with estimated lifetime savings of \$137.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 22+ years (25,000 hours) with estimated lifetime savings of \$137.50 over incandescent bulbs.
 Color	Daylight (5000K)	Soft white (2700K)	Daylight (5000K)	Daylight (5000K)	Soft white (2700K)
 Warranty	10-year 100% satisfaction guarantee, redeemable at retailer	10-year 100% satisfaction guarantee, redeemable at retailer	10 years with original receipt and packaging, have to pay for shipment	10 years with original receipt and packaging, have to pay for shipment	Standard 90-day warranty, redeemable at retailer
 Price	\$6.99	\$5.49	\$2.49	\$2.49	\$6.99
Which option would you prefer?					

23. Based on these choice data from 1,000 respondents who each completed twelve choice tasks, Mr. Boedeker conducted the analyses that ultimately led him to conclude that “each consumer who bought Defendants’ light bulbs with the false Longevity Claims overpaid”; that “consumers also overpaid because of the warranty claim”; and that “the method proposed and described in [his] report can be used to expand the results of the conjoint study to a complete model to calculate class-wide damages.”<sup>33</sup> Mr. Boedeker’s report provides little

<sup>31</sup> “LED Conjoint Survey.docx.” Attributes included “Color, Dimmable, Indoor / Outdoor, Warranty, Lifetime, Comparison to cheap LED light bulbs, Price per bulb.”

<sup>32</sup> Excerpt of “LEDSURVEYCONJOINTSCREENSHOTS (1.14.19).pdf,” p. 20.

<sup>33</sup> Boedeker Report, ¶¶ 170, 172, 174.



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detail regarding the mathematical operations involved in the complex output of the Hierarchical Bayesian model underlying his analyses. Instead, Mr. Boedeker superficially sketches out a four-step process to analyze the data of his choice-based conjoint survey:

“a. Step 1: Based on the results from the CBC analysis, compute individual part-worths for each respondent for each attribute and each level in the study.”

b. Step 2: Construct the demand curves for the product in the actual world and the but-for world.

c. Step 3: Quantify the drop in consumer demand, if any, and the corresponding economic loss that the purchasers experienced because they were unaware at the point of purchase in the actual world that the Longevity Claims are false.

d. Step 4: Conduct market simulations to assess the drop in demand for a large variety of product combinations.”<sup>34</sup>

24. As Mr. Boedeker’s descriptions of his individual analyses are sparse and vague, in Section V.A, I describe my understanding of his analyses based on my review of his statistical programs and report.

### **III. MR. BOEDEKER’S EXPLORATORY “PRE-TEST” GENERATES BIASED INFORMATION ABOUT CONSUMER PREFERENCES DUE TO NUMEROUS FLAWS**

25. Mr. Boedeker’s exploratory “Pre-Test” survey is fraught with fundamental problems that yield invalid, irrelevant, and biased data. His questions are phrased in a leading manner and his answer options are lengthy, overlapping in their meaning, and likely confusing to respondents. As I discuss further in Section VI.A, even though Mr. Boedeker refers to his

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<sup>34</sup> Boedeker Report, ¶ 139.

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exploratory survey on consumer preferences as a “Pre-Test,” it is by no means a pretest, as defined by academic literature.<sup>35</sup> In fact, Mr. Boedeker did not appropriately pretest his exploratory “Pre-Test” study. As result, Mr. Boedeker has no way of knowing how respondents interpreted his questions and answer options, whether they could disentangle seemingly similar answer options, or whether they understood the questions and answer options at all.

26. Putting aside the fundamental design flaws in his “Pre-Test” survey, Mr. Boedeker’s analyses of the “Pre-Test” survey results are insufficient to support his ultimate conclusion that “preferences between LED light bulb purchasers differ little by brand.”<sup>36</sup> Specifically, Mr. Boedeker does not compare his calculated mean attribute importance values using samples of sufficient size for drawing valid statistical conclusions. His reliance on an insufficient sample size renders his claim that Cree light bulb purchasers have the same preferences as purchasers of other brands of LED light bulbs scientifically unsupported. In other words, Mr. Boedeker has no proof that the minute number of Cree purchasers in his sample are similar to purchasers of other LED light bulb brands.

27. Further, while Mr. Boedeker claims that his “Pre-Test” provided an understanding of the “importance of certain attributes of light bulbs to consumers,”<sup>37</sup> he does not describe how the results of his “Pre-Test” informed his selection of attributes in his conjoint survey. For

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<sup>35</sup> As I mentioned in my footnote 16, Mr. Boedeker does not by any means conduct a pretest as defined and required by survey guidelines for litigation. In her *Reference Guide on Survey Research*, Dr. Shari Diamond describes a pretest as the administration of the survey to a small sample of the target population in which “interviewers observe the respondents for any difficulties they may have with the questions and probe for the source of any such difficulties so that the questions can be rephrased if confusion or other difficulties arise.” Diamond, p. 389.

<sup>36</sup> Boedeker Report, ¶ 115 and Table 2.

<sup>37</sup> Boedeker Report, ¶ 94.

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example, “Brightness / light output” was the second most important attribute in Mr.

Boedeker’s “Pre-Test” survey, but this attribute was not included in his conjoint survey.<sup>38</sup>

**A. Mr. Boedeker’s “Pre-Test” provides confusing attributes that are overlapping in meaning**

28. Many attributes in Mr. Boedeker’s “Pre-Test” are overlapping in meaning and therefore likely to confuse respondents. After qualifying for Mr. Boedeker’s “Pre-Test” survey, respondents are first asked, “Which of the following attributes are important to you in your purchasing decision when shopping for an LED light bulb?”<sup>39</sup> Respondents are presented with a list of 24 attributes to evaluate for importance. There are several flaws with this set of answer options. First, having to consider 24 attributes at once is likely to fatigue respondents and lead to guessing,<sup>40</sup> resulting in invalid responses.
29. Second, the attributes provided are not “well identified,” as answer options should be in proper survey design.<sup>41</sup> That is, certain attributes appear to have overlapping characteristics and multiple possible meanings. Contrary to Mr. Boedeker’s incorrect assertion that such overlapping meanings do not matter in conjoint survey design,<sup>42</sup> overlapping meanings likely confused respondents as to which answer option best reflected their preferences. For

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<sup>38</sup> Boedeker Report, Table 2; “LED Conjoint Survey.docx.”

<sup>39</sup> “LED Pre-Survey.docx.”

<sup>40</sup> See, for example, Holbrook, A.L., M.C. Green, and J.A. Krosnick, “Telephone Versus Face-to-Face Interviewing of National Probability Samples with Long Questionnaires: Comparisons of Respondent Satisficing and Social Desirability Response Bias,” *Public Opinion Quarterly*, Vol. 67, 2003, pp. 79-125, at p. 82. “[M]any other respondents who agree to be interviewed may become fatigued and may lose their motivation to carry out the required cognitive steps as they progress through a questionnaire.”

<sup>41</sup> Diamond, p. 394. In conjoint surveys specifically, attributes with overlapping meanings can be particularly problematic. Orme, B.K., *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research*, Research Publishers: Madison, 2006, (“Orme (2006)”), at p. 45.

<sup>42</sup> Deposition of Stefan Boedeker, *Jeff Young, individually and behalf of all others similarly situated, v. Cree Inc.*, Civil Action No. 4:17-cv-06252-YGR, United States District of California, Oakland Division, March 12, 2019 (“Boedeker Deposition”), pp. 112-113.

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example, three discrete attributes, “Color / Light Quality,” “Brightness / Light Output,” and “Warmth of light,” appear to be intertwined and overlapping in meaning. It is unclear how respondents interpreted each of these individual attributes and whether, when asked to select important attributes, they allocated points similarly to all three attributes, or tried to account in their allocations for this overlap in attributes.

30. For instance, “warmth of light,” in the context of “soft white” versus “daylight,” is often described in the light bulb market as a bulb’s “color.”<sup>43</sup> Mr. Boedeker’s conjoint survey definition for the attribute “Color” implicitly acknowledges this overlap in meaning.<sup>44</sup> In the likely event that respondents interpreted “color” and “warmth of light” to be overlapping and selected both as being important, it is unclear how respondents would allocate points between the attributes given their overlapping meaning. In fact, Mr. Boedeker himself acknowledges in his deposition that it would not be possible to disentangle such overlaps in respondent understanding.<sup>45</sup> If, instead, respondents understood “color” and “warmth of light” to be overlapping and did not choose both attributes as important, they would have provided inconsistent responses, calling the validity of their responses to the question.

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<sup>43</sup> For example, ENERGY STAR describes light bulbs as “‘warm’ colors” if they are “yellowish” and “‘cooler’ colors” if they are “whiter or bluer.” “Color and Mood,” *ENERGY STAR*, available at [https://www.energystar.gov/products/lighting\\_fans/light\\_bulbs/color\\_mood](https://www.energystar.gov/products/lighting_fans/light_bulbs/color_mood), accessed on March 4, 2019. Alternatively, it is possible that while some respondents understood “warmth of light” to relate to color, others may have understood it to mean the actual temperature of the light bulb. Mr. Boedeker acknowledges this possibility. *See* Boedeker Deposition, p. 113 (“Q. What does warmth of light mean to you? A. To me, right now, meaning that it refers to -- to the -- either like a more yellow light can give you a feeling of warmth, but it could also mean that the actual temperature, right? This is just like a word, an expression that is used...”).

<sup>44</sup> Mr. Boedeker’s conjoint defines “Color” as “The color temperature is measured in Kelvin. Lower values like the standard incandescent 2700K produce a more yellow light, higher values like 5000K create a bluer light.” “LEDSURVEYCONJOINTSCREENSHOTS (1.14.19).pdf,” p. 13.

<sup>45</sup> “A. I said there is probably overlap, probably nonquantifiable overlap because it depends on who reads this, right? So any consumer may have a slightly different interpretation, and then to them, the overlap is -- is there or not there.” Boedeker Deposition, p. 116.

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31. As another example, the “Potential cost savings” of a bulb is directly related to the “Energy Efficient & Payback” attribute as well as the “Lifetime / no maintenance” attribute.<sup>46</sup> That is, a more energy-efficient light bulb will likely also have high cost savings. Additionally, a light bulb with an “Eco / Green / Environment” attribute is likely energy-efficient and therefore also has higher potential cost savings. Without a proper pretest, Mr. Boedeker is unable to determine how respondents understood these attributes.
32. Figure 2 below highlights examples of such overlapping attributes in Mr. Boedeker’s “Pre-Test” survey.

**Figure 2. Examples of Attributes in Mr. Boedeker’s “Pre-Test” Survey with Overlapping Meaning<sup>47</sup>**

<u>Mr. Boedeker’s Attributes</u>	<u>Themes</u>
Energy efficient & payback	Lifetime
Potential cost savings	
Eco / green / environment	
Lifetime / no maintenance	
Brightness / light output	Color
Color / light quality	
Warmth of light	
Bulb design / size / build / weight / quality	Shape / Appearance
Appearance	
Bulb coating / glass	
Packaging	

<sup>46</sup> In fact, Mr. Boedeker acknowledges this overlap himself in his conjoint survey design, where his “lifetime” attribute definition includes the number of years and hours a bulb will last, as well as energy costs and lifetime savings. In his deposition he also stated, “Cost savings is a comparison to something else, which is implied longevity.” Boedeker Deposition, p. 82.

<sup>47</sup> Boedeker Report, Table 2.

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33. Mr. Boedeker makes no attempt to resolve this complexity for respondents. He provides no description to respondents to explain any of the listed attributes, and, as a result, it is unclear how respondents interpreted any of the 24 attributes. For example, Mr. Boedeker provides the attribute “Appearance,” but it is unclear to what exactly the attribute is referring. Respondents who selected “Appearance” may have thought about the warmth and/or color a light bulb emits, while other respondents may have thought about the size, shape, and bulb coating of the light bulb itself (all of these are also attributes offered in Mr. Boedeker’s “Pre-Test” survey).<sup>48</sup> Mr. Boedeker cannot know how his respondents interpreted the unclear attributes with overlapping meanings, and his data from the point-allocation exercise are muddled by this complexity.
34. Mr. Boedeker presents no support that his attributes are clearly understood by respondents, that they have a singular meaning to respondents, or that respondents did not struggle with the task overall. Because Mr. Boedeker did not conduct a proper pretest of his “Pre-Test” survey, it is impossible to know how respondents interpreted the provided attributes. Therefore, the results of his “Pre-Test” survey are entirely invalid.
35. Apart from the complex nature of overlapping attributes, the constant-sum allocation instruction in Mr. Boedeker’s “Pre-Test” survey is incomplete. Constant-sum scales typically ask respondents to allocate a number of points, in this case 100, *in proportion to* the relative importance of the attributes. Mr. Boedeker’s “Pre-Test” instructions did not include the “in proportion to” language. As such, it is impossible to be sure what respondents intended the

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<sup>48</sup> Mr. Boedeker himself acknowledges such overlap. “Q. The attribute that -- that you included in the -- in the survey called “Appearance,” what does that mean? A. I mean, again, I mean, it means whoever takes the survey, what it means to them, right? Appearance could be design. It could be how it looks when it’s in the light fixture, in their house, right, in there [sic] apartment. Appearance is just something that is a more abstract design look kind of, like, attribute, which is maybe a category that may be of relevance to -- to some consumers.” Boedeker Deposition, p. 115.

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precise allocations to be. Without an understanding of what respondents' intended their allocations to signify, taking arithmetic means across individual respondents is meaningless and does not allow Mr. Boedeker to draw valid conclusions about respondents' preferences for LED light bulbs.

**B. Mr. Boedeker's exploratory "Pre-Test" questions are leading and likely encouraged respondents to guess in a manner that biases results**

36. Mr. Boedeker's failure to ask questions in a balanced, non-leading manner pushes respondents to consider the attributes presented by Mr. Boedeker to be "important" to them. After qualifying for Mr. Boedeker's "Pre-Test" survey, respondents are first asked the unbalanced and potentially leading question, "Which of the following attributes are important to you in your purchasing decision when shopping for an LED light bulb?"<sup>49</sup> This question assumes that there is at least one provided attribute that is important to consumers in their LED light bulb purchase decisions. Best practices in survey design suggest that such unbalanced formulations of questions be avoided.<sup>50</sup> The leading nature of this question likely inflated the reported and computed "importance scores" of the attributes queried in Mr. Boedeker's "Pre-Test" survey.

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<sup>49</sup> "LED Pre-Survey.docx."

<sup>50</sup> For a discussion regarding balanced question design, see Jacoby, J., "Are Closed-Ended Questions Leading Questions?" in *Trademark and Deceptive Advertising Surveys: Law, Science and Design*, eds. S.S. Diamond and J.B. Swann, American Bar Association, Section of Intellectual Property Law, 2012, pp. 261-284, ("Jacoby"), at pp. 274-275. "When the question itself or the response options provided with the question are weighted more in one direction rather than another, the question is a leading question. Failure to be balanced assumes many different forms," Jacoby, at p. 274. Examples of a failure to be balanced include "failure to provide options representing opponent's argument(s) or position(s)" and "failure to give comparable explicit emphasis to the affirmative, negative, and neutral positions," Jacoby, at pp. 274-275.

**C. Mr. Boedeker cannot conclude from his “Pre-Test” that there is no difference in preferences between Cree purchasers and purchasers of all other brands**

37. Mr. Boedeker’s conclusion that Cree purchasers in his sample have the same preferences as purchasers of other brands cannot be supported. He relies on statistical tests that do not have adequate statistical power to allow him to arrive at his conclusion. Mr. Boedeker seems to ignore that only 43 (out of 500) respondents in his “Pre-Test” survey were Cree light bulb purchasers. This sample size is insufficient to conduct meaningful statistical significance tests, as the statistical power of a two-sample t-test with sample sizes of 43 (Cree purchasers) and 457 (non-Cree purchasers) is only 0.25,<sup>51</sup> far less than the commonly recommended statistical power of 0.8.<sup>52</sup> Therefore, Mr. Boedeker’s finding that there is “no statistically measurable difference in the preferences of respondents who had purchased Cree branded LED light bulbs and all other respondents”<sup>53</sup> is not supported by his analysis, and Mr. Boedeker has no proof that the minute number of Cree purchasers in his sample is similar to the large number of purchasers of other LED light bulb brands in his sample. It is unclear whether Mr. Boedeker’s conjoint survey reflects the preferences of Cree purchasers, as his sample consisted of LED light bulb purchasers generally.

**IV. MR. BOEDEKER’S CONJOINT SURVEY IS RIFE WITH DESIGN FLAWS THAT RENDER IT INVALID**

38. Mr. Boedeker’s flawed and biased conjoint survey design cannot yield valid results. His conjoint choice tasks reflect an unrealistic marketplace scenario (i.e., including neither

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<sup>51</sup> Boedeker Report, Table 2 and “FinalLEDpilot010719.xlsx.” See also “Section III.C - T-test Power Calculation.pdf.”

<sup>52</sup> Power is the probability that a statistical test will lead to statistically significant results (given there is indeed a difference to measure). Academic literature recommends that researchers aim for a power of 0.8. See Cohen, J., “A Power Primer,” *Psychological Bulletin*, Vol. 112, No. 1, 1992, pp. 155-159, at p. 155.

<sup>53</sup> Boedeker Report, ¶ 115.



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relevant bulb type options nor actual Cree light bulb prices) and ignores the results of his exploratory “Pre-Test” (i.e., not including the “important” attributes from his “Pre-Test” survey in his conjoint survey). In his presentation of attributes, Mr. Boedeker biases respondents by drawing extra attention to the lifetime concept by including leading language on every single choice screen (i.e., comparisons to “cheap” bulbs) and by providing two separate attributes related to product life. Mr. Boedeker further exacerbates the flaws in his choice task by describing an attribute level only as “No Claim” in his “Comparison to cheap LED light bulbs” attribute. As a result, one cannot be sure as to how respondents interpreted the absence of the claim. Do respondents ignore that attribute? Do they try to infer a claim from the other information provided? Especially in the absence of a proper pretest, Mr. Boedeker cannot know how respondents interpreted “No claim.”<sup>54</sup>

39. On top of these complicating and confusing factors, Mr. Boedeker also presents excessively complex choice tasks that likely resulted in respondents not paying sufficient attention to each choice screen.

**A. Mr. Boedeker’s conjoint choice tasks do not reflect a realistic marketplace**

*i. Mr. Boedeker’s conjoint survey ignores the results of his “Pre-Test” and relies on an arbitrary set of attributes for his choice tasks*

40. Despite having claimed that “the results from the pre-test survey will then guide the choice of attributes for the conjoint study,”<sup>55</sup> Mr. Boedeker does not explain how he ended up choosing the attributes in his conjoint survey. Notably, for example, despite the attribute “brightness / light output” appearing as the second most important attribute in his “Pre-Test” survey

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<sup>54</sup> In his deposition, Mr. Boedeker suggests that would have preferred to present respondents with a blank space instead of “No claim.” Boedeker Deposition, pp. 176-177. However, this alternative does not in any way resolve the issue. It is not clear how respondents would interpret a blank attribute level.

<sup>55</sup> Boedeker Report, ¶ 63.

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results, Mr. Boedeker does not include a brightness-related attribute in his conjoint survey.<sup>56</sup> Further, essential attributes such as “brand” and other potentially relevant characteristics such as “made / assembled in USA” did not appear in Mr. Boedeker’s conjoint survey, despite being valued more highly by “Pre-Test” respondents than some attributes that he *did* include in his conjoint survey (e.g., “dimmable”). A reliable conjoint survey should consist of attributes that are important and relevant to consumers in their purchase decisions.<sup>57</sup> Mr. Boedeker’s conjoint survey presents consumers with a more or less arbitrary set of attributes and therefore lacks realism and fails to present a market-typical scenario to respondents. Without presenting a scenario that reflects realistic choices, Mr. Boedeker cannot reliably use his conjoint data to assess actual consumer preferences.

*ii. Mr. Boedeker examines an unrealistic purchase decision by focusing exclusively on a specific type of LED light bulbs in his choice tasks*

41. Mr. Boedeker’s choice tasks were also unrealistic due to the exclusive focus on LED light bulbs. Each of Mr. Boedeker’s respondents was presented with 12 choice screens and given the option of choosing among five light bulbs on each of the choice screens — all of which were LED light bulbs. The presentation of exclusively LED light bulbs is not a representative choice set for LED light bulb purchasers. Both publicly available data on consumer

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<sup>56</sup> Interestingly, in Table 4 of his report and his conjoint survey script, Mr. Boedeker lists a brightness-related attribute, “lumen,” as an “attribute presented to survey respondents.” However, in the final screenshots and design of his conjoint survey, there was no “lumen” attribute, suggesting that at some point Mr. Boedeker had included “lumen” but subsequently, for whatever reason, decided to remove it. Boedeker Report, Table 4; “LED Conjoint Survey.docx.”

<sup>57</sup> “Several alternate means exist for identifying the attributes which are relevant to consumers in forming their preferences. A preliminary data collection effort, questioning consumers regarding attributes important to them, usually helps in identifying those attributes that are most frequently regarded as relevant [...] repertory grid, focus group interviews, or judgments of product managers, retailers and others knowledgeable about the product/service and its uses can be used for this purpose.” Green, P.E., and V. Srinivasan, “Conjoint Analysis in Consumer Research: Issues and Outlook,” *Journal of Consumer Research*, Vol. 5, No. 2, 1978, pp. 103-123, at pp. 104-105. *See also*, Lehmann, D. R., S. Gupta, and J. H. Steckel, *Marketing Research*, Addison Wesley Educational Publishers Inc., 1998, at p. 546; Orme (2006), at p. 43-46.

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purchases and Mr. Boedeker's own "Pre-Test" survey demonstrate that typical purchasers of LED light bulbs consider other types of light bulbs (e.g., incandescent or halogen light bulbs) before making their purchase selections. As a result, Mr. Boedeker's conjoint survey presented respondents with unrealistic choice sets that do not reflect the breadth of products that they would consider in the marketplace.

42. A publicly available report from the U.S. Department of Energy on the U.S. lighting market in 2015 showed that residential consumers utilize different types of light bulbs in different rooms, suggesting that consumers who purchase LEDs are also considering and buying other types of light bulbs.<sup>58</sup>

**Figure 3. Overview of Light Bulb in U.S. Homes (Year: 2015, Counts by Room)<sup>59</sup>**

	Incandescent	Halogen	CFL	Linear Fluorescent	HID	LED	Other	Total
Basement(s)	32%	15%	36%	11%	0%	6%	0%	100%
Bathroom(s)	45%	16%	31%	3%	0%	6%	0%	100%
Bedroom(s)	32%	19%	41%	1%	0%	7%	0%	100%
Closet(s)	31%	20%	42%	4%	0%	4%	0%	100%
Dining Room(s)	53%	17%	23%	0%	0%	7%	0%	100%
Exterior(s)	32%	27%	32%	2%	0%	6%	1%	100%
Garage(s)	11%	5%	12%	69%	0%	3%	0%	100%
Hall(s)	46%	11%	34%	0%	0%	7%	0%	100%
Kitchen(s)	28%	14%	29%	19%	0%	10%	0%	100%
Laundry / Utility Room(s)	17%	14%	41%	22%	0%	4%	1%	100%
Living / Family Room(s)	36%	16%	39%	1%	0%	7%	0%	100%
Office(s)	33%	11%	41%	6%	0%	9%	0%	100%
Other	37%	12%	31%	11%	0%	9%	0%	100%
<b>Average</b>	<b>35%</b>	<b>16%</b>	<b>33%</b>	<b>8%</b>	<b>0%</b>	<b>7%</b>	<b>0%</b>	<b>100%</b>

43. According to the U.S. Energy Information Administration's 2015 Residential Energy Consumption Survey, only 3.6% of all households with LED light bulbs installed indoors

<sup>58</sup> "2015 U.S. Lighting Market Characterization," *U.S. Department of Energy*, November 2017, available at [https://www.energy.gov/sites/prod/files/2017/12/f46/lmc2015\\_nov17.pdf](https://www.energy.gov/sites/prod/files/2017/12/f46/lmc2015_nov17.pdf) ("U.S. Lighting Market"), p. 65.

<sup>59</sup> U.S. Lighting Market, Table 4.12.

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have exclusively LED light bulbs; the rest use some combination of light bulb types.<sup>60</sup> I understand that even when consumers are looking for LED light bulbs for a particular application, consumers still consider a variety of different types of LED light bulbs (e.g., light bulbs of various wattages, reflector/downlight/specialty light bulbs in addition to the standard A-type).<sup>61</sup> Mr. Boedeker's decision to only include two wattages of standard A-type LED light bulbs in his conjoint survey completely ignores this market reality.

44. Both Mr. Boedeker's "Pre-Test" survey and his conjoint survey screener show that his respondents did not exclusively purchase LED light bulbs. In his "Pre-Test" survey, 37.4% of Mr. Boedeker's respondents indicated that they had also purchased incandescent light bulbs, while 33%, 26.6%, and 20.6% indicated that they had also purchased CFL light bulbs, fluorescent tubes, and halogen light bulbs, respectively.<sup>62</sup> Similarly, in his conjoint survey, 29.9% of Mr. Boedeker's respondents indicated that they had purchased incandescent light bulbs, while 27.2%, 22.7%, and 22.0% indicated that they had also purchased CFL light bulbs, fluorescent tubes, and halogen light bulbs, respectively.<sup>63</sup> Mr. Boedeker's own data demonstrate that a more representative choice set would include other, non-LED light bulbs.
45. Additionally, Mr. Boedeker's choice tasks present every light bulb option with a lifetime savings comparison *relative to incandescent* light bulbs (e.g., "Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs"). Yet, Mr. Boedeker provides no incandescent light bulbs as a choice alternative.

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<sup>60</sup> In 2015, 28.6% (33.8 million) of U.S. homes had "at least one LED bulb" installed indoors. Only 1.0% (1.2 million) of U.S. homes had all light bulbs as LEDs. "Table HC5.1 Lighting in U.S. homes by housing unit type, 2015" *U.S. Energy Information Administration*, February 2017, available at <https://www.eia.gov/consumption/residential/data/2015/hc/php/hc5.1.php>.

<sup>61</sup> Communication with Scott Schwab, March 8, 2019.

<sup>62</sup> Boedeker Report, Figure 12.

<sup>63</sup> "FinalLED011519.xlsx."

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46. Even in the LED light bulbs he does present, Mr. Boedeker does not include realistic attributes for those products. In addition to not reflecting realistic price ranges for Cree LED light bulbs, which I will discuss below, Mr. Boedeker's "Warranty" and "Comparison to cheap LED light bulbs" attributes were not based on any actual representations present in the LED light bulb marketplace.<sup>64</sup>

*iii. Mr. Boedeker's prices do not accurately reflect the range of prices for Cree light bulbs in the marketplace*

47. Even though Mr. Boedeker spends considerable time discussing marketplace supply and equilibrium prices in his report,<sup>65</sup> the ranges of prices in his conjoint survey are too low and too narrow to reflect a realistic marketplace. Mr. Boedeker claims that he chose prices that were "representative prices for a 60 W/100W light bulb,"<sup>66</sup> resulting in prices ranges of "\$0.99 to \$6.99 for 60W equivalent LED light bulbs and \$2.99 to \$10.99 for 100W equivalent LED light bulbs."<sup>67</sup> However, in his review of prices available at Amazon.com, HomeDepot.com, and Lowes.com depicted in his Figure 25, Mr. Boedeker's backup materials indicate that he considered only two Cree light bulbs out of the 55 light bulbs listed across brands for 60W and zero Cree bulbs out of the 52 light bulbs listed across brands for

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<sup>64</sup> "Q...Do you know whether Cree has ever had a warranty for a consumer LED bulb that is consistent with levels one, two, or three in the warranty row between 2015 and 2019?...THE WITNESS: I'm not aware of -- I have not studied any warranties that Cree may or may not have had. Again, this is, like, in the conjoint menu having the warranty attribute with three different levels to see if consumers show -- if -- if any of these levels has different impacts on consumer demand, right? That's what this is for. So this -- in the actual study, this could easily be replaced with -- with warranties that were out there in the market by Cree or any other retailer, but since I didn't do a separate warranty analysis or study, I used these three levels." Boedeker Deposition, p. 161. "Q. Have you seen a representation on the website of any consumer LED bulb manufacturer that compares that manufacturer's bulbs to cheap LED bulbs? A. I -- I don't recall ever having seen that." Boedeker Deposition, p. 78.

<sup>65</sup> Boedeker Report, ¶¶ 21-25.

<sup>66</sup> Boedeker Report, ¶ 131.

<sup>67</sup> Boedeker Report ¶ 132.

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100W.<sup>68</sup> I understand that prices for Cree light bulbs have been as high as around \$19.99 per light bulb,<sup>69</sup> and that in fact, according to the Complaint in this matter, the Plaintiff paid between \$15 and \$20 for each of his three Cree 100 Watt Standard A-Type light bulbs.<sup>70</sup> A quick search on Amazon.com, one of the websites Mr. Boedeker used to guide his price levels, corroborated this price range in the current marketplace as well. Cree light bulbs in the exact same packaging as in Mr. Boedeker's Figure 1 had per-unit prices as high as \$18.85 for a 60W-equivalent Cree light bulb and \$19.19 for a 100W-equivalent Cree light bulb on Amazon.com.<sup>71</sup> These real-world prices are much higher than Mr. Boedeker's \$0.99-\$6.99 and \$2.99-\$10.99 price ranges for these light bulb types.<sup>72</sup> In other words, actual market prices for Cree light bulbs can be almost two to three times as high as the maximum price presented in Mr. Boedeker's conjoint survey, and his prices do not reflect the positioning of Cree as a premium light bulb brand.<sup>73</sup> While a well-designed conjoint survey does not need to capture every price found in the real-world marketplace, it should make an effort to reflect the range of readily-available prices of the products in the market.<sup>74</sup> Without that, the

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<sup>68</sup> "Lightbulb Price Research (60&100W Equiv).xlsx."

<sup>69</sup> Communication with Scott Schwab, March 8, 2019.

<sup>70</sup> Complaint, ¶ 36.

<sup>71</sup> "Cree BA19-08027OMB-12DE26-3\_1 60W Equivalent 2700K A19 LED Light Bulb with 4Flow Filament Design, Soft White," *Amazon.com*, available at [https://www.amazon.com/BA19-08027OMB-12DE26-3\\_1-Equivalent-2700K-Filament-Design/dp/B015R68O8Q](https://www.amazon.com/BA19-08027OMB-12DE26-3_1-Equivalent-2700K-Filament-Design/dp/B015R68O8Q), visited February 27, 2019. On this date, this bulb also had 67 Amazon reviews, indicating that actual consumers had purchased this bulb; "Cree SA21-16027MDFD-12DE26-1-11 Led 100W Replacement A21 Soft White (2700K) Dimmable Light Bulb," *Amazon.com*, available at <https://www.amazon.com/SA21-16027MDFD-12DE26-1-11-Replacement-White-2700K-Dimmable/dp/B01K7ZW73A/?th=1>, visited February 27, 2019. On this date, this bulb also had 164 Amazon reviews, indicating that actual consumers had purchased this bulb.

<sup>72</sup> Boedeker Report, ¶ 132.

<sup>73</sup> Communication with Scott Schwab, March 8, 2019.

<sup>74</sup> Interestingly, Mr. Boedeker appears to have previously considered higher and wider price ranges for both the 60W and 100W bulbs in his conjoint. His conjoint survey script contains per-bulb prices of \$3.99-\$11.99 for 60W replacement bulbs and \$5.99-\$13.99 for 100W replacement bulbs. "LED Conjoint Survey.docx."

imputed price-attribute tradeoffs obtained from the conjoint analysis (and the resulting computed economic loss) cannot be generalized to the price points actually found in the marketplace.

**B. Leading language on every single choice screen of Mr. Boedeker's conjoint study artificially inflates respondents' perceived value of the Longevity Claims**

48. Compounding the concerns related to the lack of market realism, each choice screen of Mr. Boedeker's conjoint study inflates his willingness-to-pay measurement by biasing respondents towards noting that a low light bulb lifetime can be equated with a "cheap" product. Specifically, Mr. Boedeker presents an attribute titled "Comparison to cheap LED light bulbs,"<sup>75</sup> which I will refer to as the "comparative lifetime claim." Respondents are repeatedly shown the term "cheap," which is a leading adjective loaded with negative connotations.<sup>76</sup> Mr. Boedeker reinforces this characterization with the leading nature of his attribute description.<sup>77</sup>
49. He also draws undue attention to this attribute relative to the others by presenting it as the only attribute with a negative connotation. By drawing undue attention to the comparative lifetime claim, Mr. Boedeker's choice screens and conjoint attribute descriptions are prone to

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<sup>75</sup> See, for example, Boedeker Report, Figure 26.

<sup>76</sup> Merriam-Webster defines "cheap" as "of inferior quality or worth." "Cheap," *Merriam-Webster*, available at <https://www.merriam-webster.com/dictionary/cheap>, accessed on February 18, 2019. In addition, Mr. Boedeker notes that respondents' interpretation of "cheap" likely varies. "Q. Okay. But sitting here today, can you tell me what "cheap LED bulbs" means in the context of your conjoint study? A. In the context of the conjoint study, it is a terminations that refers to a lower price without quantifying the lower price [...] So it basically mirrors, more or less, a purchase decision whether some unspecified -- quantitatively unspecified information but the consumer reacts to it, right? I mean, if somebody -- for somebody who has a low budget, \$4 may be expensive and \$1 is cheap. For somebody who pays \$15, anything under \$5 may be cheap." Boedeker Deposition, p. 65.

<sup>77</sup> In Mr. Boedeker's conjoint study, the "Comparison to cheap LED light bulbs" attribute is described as "Light bulbs differ in price and quality. Here we offer under certain conditions that the LED light bulb will last six times longer than cheap LED light bulbs." Boedeker Report, Table 4.

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leading respondents to overemphasize this attribute. As a result, respondents' perceived value of the attribute is likely artificially inflated. This is a critical mistake, as the goal of a conjoint survey is to measure preferences, and not to generate or amplify them.

50. Academic literature has demonstrated that the language used in surveys has an influence on how respondents answer questions.<sup>78</sup> One such phenomenon is "focusing," by which respondents give more weight to "[e]asily observed and distinctive differences" than they would in reality.<sup>79</sup> A burdensome conjoint survey can exacerbate instances of "focusing." For example, a 2001 article comparing the efficacy of conjoint and self-explicated survey approaches found that "especially when a larger number of attributes is used in a full profile conjoint analysis, respondents tend to focus on just a subset of attributes while neglecting the other ones."<sup>80</sup> By making the lifetime attributes artificially prominent, and by including more attributes than respondents can likely process or are even willing to process (see Section IV.E), Mr. Boedeker's conjoint survey design risks encountering "severe biases in estimating partworths."<sup>81</sup>

**C. Mr. Boedeker's comparative lifetime claim attribute presents a meaningless attribute level that deviates from basic conjoint design rules, yielding invalid results**

51. In addition to drawing respondents' attention to the comparative lifetime claim attribute, Mr. Boedeker does not sufficiently define the comparative lifetime claim attribute and therefore

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<sup>78</sup> Payne, S.L., *The Art of Asking Questions*, Princeton University Press, ("Payne") 1951.

<sup>79</sup> Schkade, D.A. and D. Kahneman, "Does Living in California Make People Happy? A Focusing Illusion in Judgments of Life Satisfaction," *Psychological Science*, Vol. 9, No. 5, 1998, pp. 340-346, at p. 340.

<sup>80</sup> Sattler, H. and S. Hensel-Börner, "A Comparison of Conjoint Measurement with Self-Explicated Approaches," *Conjoint Measurement: Methods and Applications*, 2<sup>nd</sup> Edition, Gustafsson, A., A. Herrmann, and F. Huber (Eds.), Springer Verlag, 2001 ("Sattler and Hensel-Borner"), at p. 125.

<sup>81</sup> Sattler and Hensel-Borner, at p. 125.



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has no way of knowing how respondents interpreted the attribute and its levels. He does not provide respondents with a concrete alternative to the claim. Specifically, respondents are either told that the light bulb “will last six times longer than cheap LED light bulbs” or “No claim.”<sup>82</sup> Respondents are not told what “No claim” means and how they should interpret the lack of a claim. For example, some respondents may think “No claim” means that the light bulb will last as long as “cheap” LEDs while others may think that “No claim” means that the light bulb will last, for example, three times longer than a cheap LED light bulb. Mr. Boedeker has no way of knowing how respondents interpreted “No claim,” or if they inferred its meaning from other attributes. If respondents did indeed infer meaning from other attributes, these inferences would likely be inconsistent not only across choice tasks, but within them as well. “No claim” is not an attribute level, but essentially a lack thereof.

52. When faced with an attribute level of simply “No claim,” respondents are missing information about how long the light bulb lasts relative to “cheap LED light bulbs.”

Academic literature has demonstrated that when consumers are missing information that they would expect to see about an attribute, they tend to perform a “discounting of alternatives with missing information,” in which they overcompensate for the missing information and perceive a lower value.<sup>83</sup> For example, a study of consumers’ inferences about missing product characteristics in beer found that, in the absence of a description, consumers inferred

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<sup>82</sup> I understand that this “will last six times longer than cheap LED light bulbs” claim has not been used in the packaging or advertising of Cree light bulbs. Communication with Scott Schwab, March 8, 2019.

<sup>83</sup> Huber, J. and J. McCann, “The Impact of Inferential Beliefs on Product Evaluations,” *Journal of Marketing Research*, Vol. 19, No. 3, 1982, pp. 324-333 (“Huber and McCann”), at p. 331. *See also*, Meyer, R.J., “A Model of Multiattribute Judgments under Attribute Uncertainty and Informational Constraint,” *Journal of Marketing Research*, Vol. 18, No. 4, 1981, pp. 428-441.

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a below-average level for the missing characteristic.<sup>84</sup> Similarly, a study of subjects choosing college courses based on a set of attributes found that only partially described courses were likely to be devalued by respondents, who “respond to such options as if their status were below par on the dimension that is not described” but do not automatically infer the lowest possible level.<sup>85</sup>

53. While some light bulbs in reality may bear a claim that others do not, the setup of Mr. Boedeker’s conjoint survey explicitly draws respondents’ attention to the lack of a claim, which they may not have otherwise noticed in a real-life purchasing situation. In Mr. Boedeker’s conjoint survey, “No claim” is not a clear attribute-level definition. To ensure meaningful results, the statistical model that Mr. Boedeker employs as part of his ultimate analysis requires that precise attribute-level definitions be provided in the conjoint survey. Mr. Boedeker’s lack of clear attribute-level definitions renders the outcomes of his conjoint survey — including part-worths, demand curves, and willingness-to-pay values — invalid.

**D. By providing respondents with the lifetime concept as two separate attributes in the choice task, Mr. Boedeker creates choice options that amplify respondents’ value of lifetime in the choice tasks. He also allows for the choice tasks to provide inconsistent information**

54. Mr. Boedeker artificially amplifies the importance of the at-issue stated light bulb lifetime attribute by presenting it together with the comparative lifetime claim discussed above. The latter guides respondents’ attention to the lifetime of the light bulb by stating that the LED product displayed on the conjoint survey screen “will last six times longer than cheap LED light bulbs.”<sup>86</sup> In other words, Mr. Boedeker presents *two* attributes related to the lifetime of

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<sup>84</sup> Huber and McCann, at p. 331.

<sup>85</sup> Yates, J.F., C.M. Jagacinski, and M.D. Faber, “Evaluation of Partially Described Multiattribute Options,” *Organizational Behavior and Human Performance*, Vol. 21, 1978, pp. 240-251, at pp. 248-249.

<sup>86</sup> Boedeker Report, Table 4, Figures 26-27.

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a light bulb, and primes respondents to perceive “lifetime” as a stand-out attribute of high importance.

55. Mr. Boedeker’s choice screens are also highly likely to confuse respondents by repeatedly providing inconsistent information in the lifetime and comparative lifetime claim attributes on the same choice screen. These inconsistencies result in LED light bulb product profiles that are not and cannot be available in the real-world marketplace.<sup>87</sup>
56. When faced with a choice screen of products that do not make sense, respondents cannot provide reliable answers to the choice task. Consequently, respondents either try to infer the meaning of some attributes from the descriptions of other attributes, ignore or devalue product attributes, or exclude complete products from their choice analysis.
57. Mr. Boedeker’s choice screens are subject to three prominent types of inconsistencies between the lifetime attribute and the comparative lifetime claim. This is not an exhaustive list, as there are other types of inconsistencies in Mr. Boedeker’s choice screens. The list below is only three especially prominent inconsistencies.
- 1) *Cheapest Bulb Cannot Be Superior to “Cheap Bulbs.”* The cheapest bulb is the only one with the claim “will last six times longer than cheap LED light bulbs” — even though it is already the cheapest LED light bulb shown. This inconsistency occurs when exactly one of the five bulbs carries the comparative lifetime claim and is the lowest-priced bulb.
  - 2) *A Bulb with the Claim Does Not Last Six Times Longer.* Relative to the cheapest bulb in the choice set, a bulb with the claim “will last six times longer than cheap LED light bulbs” does not actually last six times longer based on the number of years stated in the lifetime attribute. This inconsistency can occur when exactly

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<sup>87</sup> For a discussion of such non-representative product profiles, see Steckel, J.H., W.S. DeSarbo, and V. Mahajan, “On the Creation of Acceptable Conjoint Analysis Experimental Designs,” *Decision Sciences*, Vol. 22, No. 2, 1991, pp. 435-442.

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one of the five bulbs carries the comparative lifetime claim and is not the lowest-priced bulb.<sup>88</sup>

- 3) *Multiple Bulbs with the Claim have Different Lifetimes and Cannot All Last “Six Times Longer.”* If the comparative lifetime claim appears two or more times among the five products shown and the lifetimes of these options are not the same, then the choice set contains inconsistencies.

58. *(1) Cheapest Bulb Cannot Be Superior to “Cheap Bulbs.”* As an example, the sample choice screen in Figure 26 of the Boedeker Report, shown in Figure 4 below, presents only Option 2 with the comparative lifetime claim.

**Figure 4. Example of Mr. Boedeker’s Choice Screen<sup>89</sup>**

For a **10 Watt LED light bulb of size A19 to replace a 60 Watt incandescent bulb**, please indicate which of the given options you would select. 

	Option 1	Option 2	Option 3	Option 4	Option 5
 Indoor / Outdoor	Yes	No	Yes	No	No
 Dimmable	Yes	Yes	No	No	Yes
 Comparison to cheap LED light bulbs	No claim	The LED light bulb will last six times longer than cheap LED light bulbs.	No claim	No claim	No claim
 Lifetime	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 22+ years (25,000 hours) with estimated lifetime savings of \$137.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 4+ years (5,000 hours), with estimated lifetime savings of \$27.50 over incandescent bulbs.
 Color	Soft white (2700K)	Daylight (5000K)	Soft white (2700K)	Soft white (2700K)	Daylight (5000K)
 Warranty	10-year 100% satisfaction guarantee, redeemable at retailer	10 years with original receipt and packaging, have to pay for shipment	10 years with original receipt and packaging, have to pay for shipment	Standard 90-day warranty, redeemable at retailer	10 years with original receipt and packaging, have to pay for shipment
 Price	\$5.49	\$0.99	\$2.49	\$6.99	\$6.99
Which option would you prefer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<sup>88</sup> If, for example, the bulb with the comparative lifetime claim had a lifetime of “31+ years,” I consider there to be no inconsistency when the cheapest bulb in the same set has a lifetime of “4+ years.”

<sup>89</sup> Excerpt of Boedeker Report, Figure 26 (emphasis added).

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While Option 2 includes the comparative lifetime claim, it also comes at the lowest price on the screen, \$0.99. Respondents who follow the comparative lifetime claim will look for the cheapest option, and see that it is Option 2. They would struggle to understand how Option 2 could have a lifetime six times longer than its own lifetime. This scenario does not make sense. Mr. Boedeker presented 50.9% (509 of 1,000) of his respondents with at least one choice screen similar to Figure 4 with this inconsistency.<sup>90</sup>








(2) A Bulb with the Claim Does Not Last Six Times Longer. As another example, Figure 27 of the Boedeker Report, shown in Figure 5 below, presents Option 5 with the comparative lifetime claim, and the other Options 1-4 as products with “No claim.”

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<sup>90</sup> See Exhibit 1. Analogously, 6.3% (750 of 12,000) of choice screens shown to respondents contained this inconsistency. “LEDdesign010819.csv;” “CBC60Watt011519.csv;” “CBC100Watt011519.csv.”

*Confidential***Figure 5. Example of Mr. Boedeker's Choice Screen<sup>91</sup>**

For a **10 Watt LED light bulb of size A19 to replace a 60 Watt incandescent bulb**, please indicate which of the given options you would select. 

	Option 1	Option 2	Option 3	Option 4	Option 5
 Indoor / Outdoor	Yes	No	Yes	No	No
 Dimmable	No	No	No	Yes	Yes
 Comparison to cheap LED light bulbs	No claim	No claim	No claim	No claim	The LED light bulb will last six times longer than cheap LED light bulbs.
 Lifetime	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 22+ years (25,000 hours) with estimated lifetime savings of \$137.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.
 Color	Soft white (2700K)	Daylight (5000K)	Daylight (5000K)	Daylight (5000K)	Daylight (5000K)
 Warranty	Standard 90-day warranty, redeemable at retailer	Standard 90-day warranty, redeemable at retailer	Standard 90-day warranty, redeemable at retailer	10-year 100% satisfaction guarantee, redeemable at retailer	10 years with original receipt and packaging, have to pay for shipment
 Price	\$0.99	\$0.99	\$6.99	\$5.49	\$3.99
Which option would you prefer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

When respondents read the choice screen provided in Figure 5, they see confusing information that does not allow for unbiased, realistic tradeoffs. In this particular case, respondents may look at Option 5, priced at \$3.99 and the only option with the comparative lifetime claim, and see that it “will last six times longer than cheap LED light bulbs.” Respondents then look for a “cheap” LED light bulb for comparison and find Options 1 and 2 both priced at \$0.99, the cheapest possible price. They would struggle to understand how Options 1, 2, and 5 offer the same 13+ year lifetime, yet Option 5 is supposed to last six times longer than Options 1 and 2, the “cheap” LED light bulbs. This scenario does not make

<sup>91</sup> Boedeker Report, Figure 27 (emphasis added).








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sense. Mr. Boedeker presented 74.4% (744 of 1,000) of his respondents with at least one choice screen with this inconsistency.<sup>92</sup>

59. (3) Multiple Bulbs with the Claim have Different Lifetimes and Cannot All Last “Six Times Longer.” The third type of inconsistency occurs when respondents are faced with multiple options bearing the comparative lifetime claim, such as Figure 6 below.

**Figure 6. Example of Mr. Boedeker’s Choice Screen<sup>93</sup>**

For a **10 Watt LED light bulb of size A19 to replace a 60 Watt incandescent bulb**, please indicate which of the given options you would select. 

	Option 1	Option 2	Option 3	Option 4	Option 5
 Indoor / Outdoor	Yes	No	No	No	No
 Dimmable	No	No	Yes	No	No
 Comparison to cheap LED light bulbs	The LED light bulb will last six times longer than cheap LED light bulbs.	The LED light bulb will last six times longer than cheap LED light bulbs.	No claim	The LED light bulb will last six times longer than cheap LED light bulbs.	No claim
 Lifetime	Lasts 22+ years (25,000 hours) with estimated lifetime savings of \$137.50 over incandescent bulbs.	Lasts 4+ years (5,000 hours), with estimated lifetime savings of \$27.50 over incandescent bulbs.	Lasts 22+ years (25,000 hours) with estimated lifetime savings of \$137.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 31+ years (35,000 hours) with estimated lifetime savings of \$192.50 over incandescent bulbs.
 Color	Daylight (5000K)	Soft white (2700K)	Soft white (2700K)	Daylight (5000K)	Daylight (5000K)
 Warranty	10 years with original receipt and packaging, have to pay for shipment	10 years with original receipt and packaging, have to pay for shipment	10-year 100% satisfaction guarantee, redeemable at retailer	10 years with original receipt and packaging, have to pay for shipment	10-year 100% satisfaction guarantee, redeemable at retailer
 Price	\$3.99	\$3.99	\$6.99	\$5.49	\$2.49
Which option would you prefer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

60. When respondents read the choice screen provided in Figure 6, they see multiple options with the comparative lifetime claim, yet those options have different lifetimes. This scenario does not make sense, and respondents cannot reconcile these differences when comparing

<sup>92</sup> See Exhibit 1. Analogously, 10.2% (1,222 of 12,000) of choice screens shown to respondents contained this inconsistency. “LEDdesign010819.csv;” “CBC60Watt011519.csv;” “CBC100Watt011519.csv.”

<sup>93</sup> Excerpt of “LEDSURVEYCONJOINTSCREENSHOTS (1.14.19).pdf,” p. 19 (emphasis added).

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products. What are respondents to believe about the lifetime, if each option that “last[s] six times longer than cheap LED light bulbs” is shown with a different lifetime? Mr. Boedeker presented 100% (all 1,000) of his respondents with at least one choice screen with this inconsistency.<sup>94</sup>

61. Of note, a very similar inconsistency occurs in the Boedeker conjoint study when multiple light bulbs have the same lifetime attribute (e.g., “22+ years), and some carry the claim “will last six times longer than cheap LED light bulbs” while others do not carry the claim. For example, in Figure 6, Options 1 and 3 both provide lifetimes of “22+ years,” but only Option 1 would last six times longer while Option 3 does not. As mentioned above, respondents would have to attempt to wrangle with this discrepancy while making trade-offs.<sup>95</sup> Do they ignore the inconsistency, or do they attempt to infer the comparison from other information?
62. Choice screens on which respondents observe that one light bulb option “will last six times longer than cheap LED light bulbs,” while another light bulb option offers “No claim” are similarly problematic. Some respondents may try to overwrite “No claim” with wrongly inferred comparative lifetime claims by calculating the lifetime multiplier between remaining options.

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<sup>94</sup> See Exhibit 1. Analogously, 70.4% (8,447 of 12,000) of choice screens shown to respondents contained this inconsistency. “LEDdesign010819.csv;” “CBC60Watt011519.csv;” “CBC100Watt011519.csv.”

<sup>95</sup> I do not count this inconsistency separately, as it can occur in conjunction with any of the three types of inconsistencies I have described.



**Figure 7. Example of Mr. Boedeker's Choice Screen<sup>96</sup>**

For a **10 Watt LED light bulb of size A19 to replace a 60 Watt incandescent bulb**, please indicate which of the given options you would select. 

	Option 1	Option 2	Option 3	Option 4	Option 5
 Indoor / Outdoor	Yes	No	Yes	No	No
 Dimmable	Yes	Yes	No	No	Yes
 Comparison to cheap LED light bulbs	No claim	The LED light bulb will last six times longer than cheap LED light bulbs.	No claim	No claim	No claim
 Lifetime	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 22+ years (25,000 hours) with estimated lifetime savings of \$137.50 over incandescent bulbs.	Lasts 13+ years (15,000 hours) with estimated lifetime savings of \$82.50 over incandescent bulbs.	Lasts 4+ years (5,000 hours), with estimated lifetime savings of \$27.50 over incandescent bulbs.
 Color	Soft white (2700K)	Daylight (5000K)	Soft white (2700K)	Soft white (2700K)	Daylight (5000K)
 Warranty	10-year 100% satisfaction guarantee, redeemable at retailer	10 years with original receipt and packaging, have to pay for shipment	10 years with original receipt and packaging, have to pay for shipment	Standard 90-day warranty, redeemable at retailer	10 years with original receipt and packaging, have to pay for shipment
 Price	\$5.49	\$0.99	\$2.49	\$6.99	\$6.99
Which option would you prefer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

63. For example, in Figure 7 above respondents can infer that Option 3 lasts 22/13 times as long as Option 2, while Option 2 is supposed to last six times longer than the cheap bulbs.

Respondents can infer that Option 3 lasts roughly ten times ( $6 \times (22/13)$ ) as long as cheap bulbs – even in the absence of a claim. Letting respondents engage in such inferences and potentially overwrite other attributes on the choice screen is a crucial mistake in conjoint design.

64. All of the above mentioned inconsistencies within choice screens are present throughout Mr. Boedeker's conjoint design. They affect every respondent, likely forcing them to disengage

<sup>96</sup> Excerpt of Boedeker Report, Figure 26 (emphasis added).

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from the choice tasks, take the survey less seriously, and provide nonsensical choices that do not reflect their true preferences. It is especially problematic that every single respondent in Mr. Boedeker's conjoint survey encountered one of these three types of unresolvable inconsistencies between the lifetime attribute and the comparative lifetime claim in *at least 8* of their 12 choice screens. Further, almost 80 percent of respondents were presented with these inconsistencies in *at least 10* of their 12 choice screens.<sup>97</sup> Presenting inconsistent attribute information to respondents is an error that cannot be adjusted for during the data analysis and that renders all of Mr. Boedeker's results invalid.

**E. Mr. Boedeker's excessively complex choice tasks likely resulted in disengaged respondents**

65. Choice-based conjoint designs implicitly assume that respondents look at each of the displayed alternatives and compare them by examining the levels of each attribute across the choice alternatives. Respondents then trade off the various attributes in order to arrive at a final choice. This process is complex and, as a result, the more attributes and attribute levels a choice screen displays, the more stress or cognitive burden the task imposes upon a respondent. Ultimately, an overly complex choice task will fatigue respondents by overloading them with excessive information.
66. Conjoint design guidelines recommend that there be no more than six attributes on a given choice screen.<sup>98</sup> Mr. Boedeker acknowledges this standard and states "[t]he literature recommends that Choice Based Conjoint studies involve about six or fewer attributes...to

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<sup>97</sup> "LEDdesign010819.csv;" "CBC60Watt011519.csv;" "CBC100Watt011519.csv." 86.8% (10,419) of the 12,000 choice screens shown to respondents were subject to one of the three types of inconsistencies I described. *See* Exhibit 1.

<sup>98</sup> Orme (2006), at pp. 33, 35, 43.

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address issues of fatigue and general ability of respondents to process information.”<sup>99</sup> Mr. Boedeker also notes that “some authors believe that the number of cells on a choice menu [...] should not exceed twenty while others tend to favor the notion that respondents are not hard pressed to process more pieces of information.”<sup>100</sup> Despite these acknowledgements, Mr. Boedeker presents respondents with five product profiles with seven attributes each, requiring respondents to process 35 cells of information per choice screen.

67. In Mr. Boedeker’s conjoint survey, respondents were confronted with much more information than they would be comfortable processing. Consumer information overload could easily impact how respondents view the information in front of them. Academic research has demonstrated that information overload makes respondents less likely to process all the information placed in front of them.<sup>101</sup>

68. Such behavior is often referred to as “satisficing,” and according to Krosnick and Presser (2010):

“Rather than expend the effort necessary to provide optimal answers, respondents may take subtle or dramatic shortcuts. In the former case, respondents may simply be less thorough in comprehension, retrieval, judgment, and response selection. They may be less thoughtful about a question’s meaning; search their memories less comprehensively; integrate retrieved information less carefully; or select a response choice less precisely (emphasis added).”<sup>102</sup>

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<sup>99</sup> Boedeker Report, ¶ 62.

<sup>100</sup> Boedeker Report, ¶ 62.

<sup>101</sup> Kivetz, R. and I. Simonson, “The Effects of Incomplete Information on Consumer Choice,” *Journal of Marketing Research*, Vol. 37, No. 4, 2000, pp. 427-448, at p. 428.

<sup>102</sup> Krosnick, J.A. and S. Presser, “Question and Questionnaire Design,” *Handbook of Survey Research*, 2<sup>nd</sup> Edition, Wright, J.D. and P.V. Marsden (Eds.), Emerald Group Publishing Limited, 2010, pp. 263-313, at p. 265.

69. While “authors” may have differing opinions about the number of cells respondents can comfortably process, Mr. Boedeker’s conjoint survey results themselves demonstrate that his 35 cells of information, presented 12 times, was overly burdensome for respondents and likely resulted in satisficing and invalid data.
70. The data from Mr. Boedeker’s conjoint survey suggest that many respondents likely did not pay adequate attention to each choice screen and satisficed. One quarter of respondents (250 of the 1,000) completed the choice tasks at a rate of approximately 11.7 seconds per choice screen.<sup>103</sup> Less than twelve seconds is hardly enough time to process the information of 35 cells of information, select a preferred light bulb, and then consider whether one would purchase the light bulb selected.<sup>104</sup> The fact that at least a quarter of respondents proceeded through the choice tasks at this rate indicates that the design of the choice tasks caused respondents to not pay attention to the choice task or to be unwilling to properly engage in the decision.
71. In addition to presenting respondents with an excessive amount of information, Mr. Boedeker did not specify to respondents that all other attributes not mentioned in the exercise should be assumed equal across the five products shown. Given such deficient instruction, it’s not clear how respondents performed the required comparisons and selected

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<sup>103</sup> In other words, 250 of the 1000 respondents went through all 12 choice tasks in 2 minutes 20 seconds or less. “FinalLED011519.xlsx.” Mr. Boedeker acknowledges that respondents progressing too quickly through the survey is a concern and that such respondents should be excluded from analysis. *See* Boedeker Deposition, pp. 204-205.

<sup>104</sup> Open-ended responses to Mr. Boedeker’s question, “Did you have a clear understanding of the questions in this survey?” indicate that some respondents found that the survey contained too much information. For example, respondents stated “Too many options,” “Too much data to comprehend,” and “what was the point of give [sic] so many options that weren’t really comparable.” “FinalLED011519.xlsx.”

a product. Consequently, Mr. Boedeker's conjoint data and resulting willingness-to-pay calculations are invalid.

**V. MR. BOEDEKER'S ANALYSES OF HIS CONJOINT DATA SUFFER FROM CONCEPTUAL AND TECHNICAL FLAWS**

72. Beyond the many critical design flaws of the conjoint survey, Mr. Boedeker's analyses of his conjoint data are conceptually and technically flawed. His method of calculating willingness-to-pay is not an accepted practice in conjoint studies, and he constructs what he calls "demand" curves with no consideration of actual products that exist in the marketplace. Despite discussing the concepts of both supply and demand in his theoretical framework, Mr. Boedeker does not account for supply-side dynamics in his conjoint analysis. Further, Mr. Boedeker's results are illogical. In particular, they suggest some respondents preferred shorter lifetimes to longer ones.

**A. Overview of Mr. Boedeker's conjoint analysis**

73. Mr. Boedeker's descriptions of his individual analyses are sparse and vague, and it is unclear from his produced backup how he arrived at some of the values in his report, such as the willingness-to-pay values in ¶ 170. Based on my review of Mr. Boedeker's statistical programs and his report, I understand the following:

74. First, Mr. Boedeker estimates a posterior distribution of 10,000 draws for the respondent level attribute part-worths; i.e., the individual utilities for each specific attribute level included in the conjoint survey, using Hierarchical Bayesian Estimation ("HBE") in

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Sawtooth.<sup>105,106</sup> When calculating each respondent’s attribute part-worths, Mr. Boedeker imposes a “monotonicity constraint” to ensure that the statistical model presumes respondents’ to gain less utility from higher prices, and more utility from lower prices.<sup>107</sup> He states that without such a constraint, “the utility estimates may yield higher numerical values for levels that seem to be lower in utility for some individuals, and thus seemingly indicate ‘illogical’ consumer choices.”<sup>108</sup> Mr. Boedeker further suggests that he imposed such a constraint to make “the demand curves...smoother” with “fewer extreme data points.”<sup>109</sup>

75. Second, Mr. Boedeker uses the part-worths estimates for each of the 10,000 draws of his estimated model to “construct the demand for the product when the advertised claim is believed to be true by the consumer at the point of purchase.”<sup>110</sup> For example, for the first draw of 10,000, Mr. Boedeker first calculates “the share of all respondents who would purchase a product constructed from a permutation of all attribute levels for a given price.”<sup>111</sup> Specifically, he computes the total utility (i.e., the sum of part-worths for each of the attributes) for each individual respondent for a given product profile (e.g., a light bulb with a lifetime of 31+ years) at each of the five different prices for a specific combination of

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<sup>105</sup> See Orme (2006), at pp. 1-5.

<sup>106</sup> Boedeker Report, ¶ 140. For a discussion of HBE, see Johnson, R.M., “Understanding HB: An Intuitive Approach,” *Sawtooth Software Research Paper Series*, 2000.

<sup>107</sup> Boedeker Report, ¶¶ 140-141. In his production materials, Mr. Boedeker provides the results of his analysis without the monotonicity constraint. He does not discuss these results in his report beyond stating that he “found very small differences between [the analysis with the constraint and the analysis without the constraint].” Boedeker Report, ¶ 144.

<sup>108</sup> Boedeker Report, ¶ 141.

<sup>109</sup> Boedeker Report, ¶ 143.

<sup>110</sup> Boedeker Report, ¶¶ 148, 152.

<sup>111</sup> Boedeker Report, ¶ 161.

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attributes.<sup>112</sup> He then uses the total utility for each respondent at a specific price level to determine a probability share by comparing the total utility gained from purchasing the light bulb with the specified product profile to the utility of the “Outside-option,” (i.e., the option of choosing to not purchase any of the displayed light bulbs).<sup>113</sup> In other words, for the first draw of 10,000, Mr. Boedeker’s analysis calculates the fraction of survey respondents that prefer (i.e., would choose to purchase) the specified product at a specified price instead of not purchasing a light bulb at all.<sup>114</sup>

76. Next, Mr. Boedeker further aggregates the probability shares for the first draw by calculating the mean probability share across all respondents at each price point. The resulting five aggregated mean probability shares for each price form the input into a regression model that fits a regression line through these five data points, with the aggregated mean probability share on the x-axis and price on the y-axis.<sup>115</sup> Mr. Boedeker touts this fitted curve a “demand” curve.<sup>116</sup>

77. Mr. Boedeker constructs these types of “demand” curves for both the actual and the “but-for” world. Using the exact same approach as described above, for a given product profile, he varies the lifetime to be “4+ years” in the but-for world and 13+, 22+, or 31+ years in the

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<sup>112</sup> “LED Analysis - 60W - WPC.nb;” “LED Analysis - 100W - WPC.nb”

<sup>113</sup> “LED Analysis - 60W - WPC.nb;” “LED Analysis - 100W - WPC.nb”

<sup>114</sup> “LED Analysis - 60W - WPC.nb;” “LED Analysis - 100W - WPC.nb” I note that this does not reflect a marketplace decision. While it is certainly possible that a consumer can choose not to purchase anything, he or she likely has more alternatives than only purchasing a Cree light bulb, as represented by Mr. Boedeker’s conjoint, and purchasing nothing.

<sup>115</sup> “LED Analysis - 60W - WPC.nb;” “LED Analysis - 100W - WPC.nb”

<sup>116</sup> “LED Analysis - 60W - WPC.nb;” “LED Analysis - 100W - WPC.nb;” Boedeker Report, ¶ 161. The demand curve is fitted using a log-linear regression where linear prices are regressed over logged probability shares.

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actual world.<sup>117,118</sup> An example of such a pair of “demand” curves is presented in Figure 34 of Mr. Boedeker’s report.<sup>119</sup> As evident in this example, the “demand” curve for the actual world is located above the “demand” curve reflecting the but-for world. While Mr. Boedeker does not specify from which draw in his data these “demand” curves are fit, his statistical code indicates that he creates “demand” curve pairings for all possible light bulb product permutations for each of the 10,000 draws that resulted from the Hierarchical Bayesian estimation.<sup>120</sup>

78. Third, Mr. Boedeker suggests that all else equal, “when the consumer knows about the falsity of the Longevity Claims in the but-for world, the levels of the attributes change, and the light bulbs become less attractive to consumers leading to a downward shift of the demand curve.”<sup>121</sup> Mr. Boedeker appears to say that in a but-for world respondents understand the light bulb to have a (much shorter and less valuable) lifetime of 4+ years instead of, for example, 31+ years, which leads to a down-shift of the but-for “demand” curve. Ultimately, this shift is the basis for Mr. Boedeker’s economic loss calculation.<sup>122</sup>

79. As mentioned above, Mr. Boedeker creates numerous “demand” curve pairings: one for each of the possible product profiles for each of the 10,000 draws from his Hierarchical Bayesian model. Because Mr. Boedeker seeks to determine the difference in price between his “actual” and “but-for” “demand” curves, he calculates the distance between these curves at ten

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<sup>117</sup> Boedeker Report, ¶ 161.

<sup>118</sup> “LED Analysis - 60W - WPC.nb;” “LED Analysis - 100W - WPC.nb”

<sup>119</sup> Boedeker Report, ¶ 161.

<sup>120</sup> Boedeker Report, ¶ 164.

<sup>121</sup> Boedeker Report, ¶ 162.

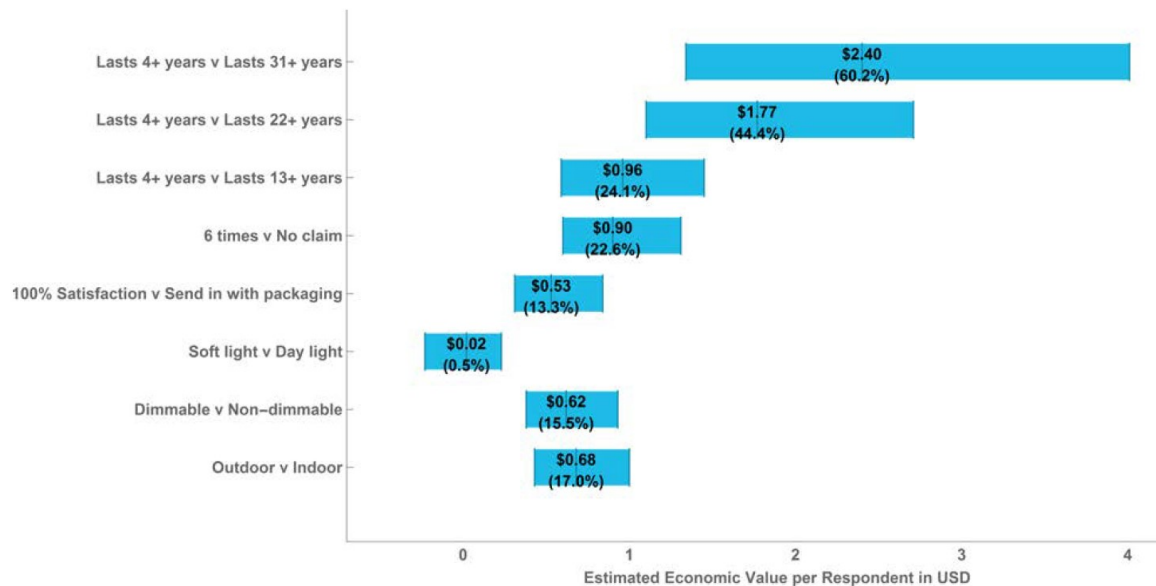
<sup>122</sup> Boedeker Report, ¶ 162.



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different points – five corresponding to the x-axis probability shares from the but-for world “demand” curve and five corresponding to the x-axis probability shares from the actual world “demand” curve. As a last step, Mr. Boedeker then aggregates these 4.8 million distances by taking the median across all draws and all prices.<sup>123</sup> The result is his estimate of “economic loss” to consumers expressed in absolute dollars.<sup>124</sup> Ultimately, Mr. Boedeker estimates the “economic loss” associated with each attribute included in his conjoint survey, as displayed in Figure 8.<sup>125</sup>

**Figure 8. Example of “Economic Loss” Calculated Using Mr. Boedeker’s Method – 60W Replacement<sup>126</sup>**



<sup>123</sup> For each of the 10,000 draws, there are 48 possible products for each lifetime attribute level. Mr. Boedeker constructs two “demand” curves based on five price points each, resulting in 10 distance measures between the actual and but-for “demand” curves. As a result, there are  $10,000 \times 48 \times 10 = 4.8$  million distance measures. The 48 possible products are calculated as multiplying the levels for all non-lifetime non-price attributes ( $2 \times 2 \times 2 \times 3 \times 2$ ).

<sup>124</sup> Boedeker Report, ¶¶ 166-167; “LED Analysis - 60W - WPC.nb;” “LED Analysis - 100W - WPC.nb” Mr. Boedeker also constructs 90% confidence intervals across all of these “actual” versus “but-for” comparisons. Boedeker Report, ¶ 164, Figures 35 and 36.

<sup>125</sup> See Boedeker Report, Figures 35 and 36.

<sup>126</sup> Boedeker Report, Figure 35.

80. While Mr. Boedeker presents this vague framework as a way by which he can calculate “economic loss” associated with a 4+ year lifetime (versus a 13+, 22+, or 31+ year lifetime), he does not specify how he would determine the concrete damages to consumers associated with the alleged misconduct by Cree. Based on his methodology and his deposition testimony, it remains unclear as to how Mr. Boedeker’s conjoint methodology and analysis addresses the specific allegations stated in the Complaint.<sup>127</sup>

**B. Mr. Boedeker’s method of calculating willingness-to-pay is not in line with accepted practices in conjoint analysis**

81. Mr. Boedeker’s methodology for calculating consumers’ willingness-to-pay for the longevity claimed is not in line with accepted methodologies of conjoint analysis. Academic literature (and Sawtooth Software’s technical papers) suggest two commonly-used and tested approaches to calculating willingness-to-pay in conjoint analysis: computing dollar values corresponding to attribute utilities, and creating market simulations of realistic competitive scenarios.<sup>128</sup>

82. To compute dollar values corresponding to attribute utilities, one compares the change in price between different attribute levels to the change in utility. For example, if for a particular respondent a \$10 price level is 3 utility points and a \$5 price level is 1 utility point, each utility point for that respondent is equal to  $(\$10 - \$5) / (3 - 1) = \$2.50$ . The second method uses market simulations to incorporate a competitive context. A competitive scenario would be simulated with a few products in a realistic marketplace, and a simulation would

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<sup>127</sup> Specifically, Dr. Boedeker acknowledges that he included *three* longevity-related attributes in his conjoint survey but does not specify which, if any, would be used to determine damages. He simply states “And the but-for world that I’m measuring right now here is where they now have choices if one of these longevity claims would have a different value.” Boedeker Deposition, p. 203.

<sup>128</sup> Orme, B.K., “Assessing the Monetary Value of Attribute Levels with Conjoint Analysis: Warnings and Suggestions,” *Sawtooth Software*, 2001; Orme (2006), at pp. 74-78.

determine baseline preference shares. After adjusting a particular attribute level for a product, for example, simulations would be run while adjusting the price of that product until the preference shares return to the baseline shares. The difference in price that achieves the same baseline shares would reflect the willingness-to-pay for that attribute level in a realistic competitive scenario.

83. While both of these established methods have advantages and drawbacks, Mr. Boedeker does not acknowledge these methods in his report. He instead uses an ad-hoc, overly complicated, unprecedented, and unproven method, without any theoretical foundation. Mr. Boedeker relies on pseudo-demand curves, unrealistic market scenarios, and irrelevant probability shares that assess the choice of a single hypothetical light bulb versus doing nothing (without any competitive context). He provides no explanation as to why he chose to deviate from both of the common methods that have been promoted in the established literature and invent his own.

**C. Mr. Boedeker does not consider the actual products available in the marketplace when constructing his “demand curves”**

84. Mr. Boedeker’s decision to take into account all “levels of attributes and prices across all possible permutations”<sup>129</sup> when constructing his “demand” curves results in unrealistic light bulb products. For example, based on his explanation and backup materials, among others, Mr. Boedeker constructs “demand” curves for a potential light bulb that has all of the more highly valued attributes such as Daylight, Dimmable, Outdoor, 10-year warranty at retailer but with a price tag of only \$0.99 and includes the resulting price differential in his economic

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<sup>129</sup> Boedeker Report, ¶ 164.

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loss calculations.<sup>130</sup> Such a product is unlikely to exist in the actual marketplace, and therefore should not be included in any quantification of economic loss for the at-issue products.<sup>131</sup>

85. Further, Mr. Boedeker's "demand" curves are not aligned with even his own description of demand curves in Figures 5 through 10 in the theoretical framework portion of his report. Demand curves are constructed with axes of price and volume (or quantity). However, Mr. Boedeker instead constructs his curves for price versus probability or preference shares, which are the outcome of conjoint analyses.<sup>132</sup> Preference shares explicitly do not "account for many real-world factors that shape market shares," ignore supply side reactions, and "assume that all relevant attributes that influence share have been measured."<sup>133</sup> Mr. Boedeker's preference share-based pseudo-demand curves match none of these requirements and, especially in combination with the unrealistic light bulb products underlying his probability shares cannot demonstrate "economic loss."

**D. The results of Mr. Boedeker's conjoint survey are illogical and render his analysis unreliable**

86. As I discussed in Section IV.D, Mr. Boedeker's conjoint survey design presents respondents with complex and contradictory choice tasks. The impact of Mr. Boedeker's flawed design are evident in the 10,000 part-worth draws (per respondent) that Mr. Boedeker uses to construct the confidence intervals for his economic loss calculations. In particular, 23% of respondents, all else equal, had a median preference suggesting that they prefer a 4+ year

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<sup>130</sup> "LED Analysis - 60W - WPC.nb;" "LED Analysis - 100W - WPC.nb"

<sup>131</sup> I note that there are many realistic products like these included in Mr. Boedeker's analysis, all which should not be included in any quantification of economic loss for the at-issue products.

<sup>132</sup> See Boedeker Deposition, p. 197.

<sup>133</sup> Orme (2006), at p. 92.

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lifetime (the shortest lifetime in Mr. Boedeker's conjoint) to at least one longer lifetime.

Overall, 49.4% of respondents showed a preference reversal where their median preference suggested that they preferred any shorter lifetime to any longer lifetime. These results are illogical and demonstrate the inherent flaws in Mr. Boedeker's conjoint survey that render his results unreliable. That is, either the class has a significant portion of consumers who prefer shorter lifetimes to longer lifetimes, or Mr. Boedeker's data are nonsensical.

**E. Mr. Boedeker's conjoint analysis does not account for the supply side dynamics and market equilibrium**

87. Mr. Boedeker spends a considerable amount of his report discussing basic microeconomic theory.<sup>134</sup> In particular he highlights the concepts of "willingness-to-accept" ("the minimum price at which each manufacturer is willing to sell the light bulb")<sup>135</sup> and acknowledges the importance of the market equilibrium (i.e., the balance between supply and demand in the marketplace).<sup>136</sup> However, in proposing a methodology for calculating the potential economic loss, he makes significant but fatally flawed assumptions regarding the supply-side of the LED light bulb marketplace in the "actual" and "but-for" worlds. Specifically, he states that:

"In the actual world, the light bulbs sold using the Longevity Claims constitute the relevant supply for the economic loss computation. If consumers' preferences change once they find out that the Longevity Claims are false, then the light bulbs sold using the Longevity Claims are also the supply in the but-for-world. Therefore, the shift in the attribute level (i.e., Longevity Claims are disclosed to be false at the point of purchase) has no impact on the marginal costs of the manufacturer, and therefore, the supply curve

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<sup>134</sup> See Boedeker Report, Section 2.

<sup>135</sup> See Boedeker Report, Section 2.1.2.

<sup>136</sup> See Boedeker Report, Section 2.1.3.

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remains unchanged. Consequently, only the changes in the demand curve are relevant for the assessment of an economic loss to the consumers, if any.”<sup>137</sup>

88. Mr. Boedeker assumes, without evidence, that manufacturers would behave the same way if the longevity claim were removed from the light bulb. For example, the removal of the claim could result in a price adjustment on the part of manufacturers. Academic literature suggests that failure to consider supply-side dynamics results in price-premium measures that “cannot be measures of the market value of a product feature as they do not directly relate to what incremental profits a firm can earn on the basis of the product feature.”<sup>138</sup> As a result, Mr. Boedeker’s estimations likely “overstate the economic value of [the longevity claim] as they are only measures of shifts in demand and do not take into account the competitive response to the [longevity claim].”<sup>139</sup> The limitations of conjoint analysis in this respect are well-documented. It is understood that “[c]onjoint analysis predicts preference, not market share” due to various supply-side assumptions (e.g., assumes equal and proper distribution, and proper promotion).<sup>140</sup>

89. Despite his substantial discussion of market supply and demand and the resulting “market equilibrium,”<sup>141</sup> Mr. Boedeker does not determine what market equilibrium would be in the “actual” world or the “but-for” world he proposes. As a result, his potential economic loss

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<sup>137</sup> Boedeker Report, ¶ 42.

<sup>138</sup> Allenby, G.M., J. Brazell, J.R. Howell, and P.E. Rossi, “Economic Valuation of Product Features” (working paper), October 2013, available at [https://aede.osu.edu/sites/aede/files/imce/files/Seminars/Economic\\_Valuation\\_of\\_Product\\_Features\\_100813.pdf](https://aede.osu.edu/sites/aede/files/imce/files/Seminars/Economic_Valuation_of_Product_Features_100813.pdf), (“Allenby”), at p. 4.

<sup>139</sup> Allenby, at p. 43.

<sup>140</sup> Orme (2006), at pp. 23-24. Mr. Boedeker acknowledges that his methodology does not calculate “units sold in the market.” Boedeker Deposition, pp. 197.

<sup>141</sup> See Boedeker Report, Section 2.

calculations lack the proper context and do not take into account the various market factors

Mr. Boedeker highlights in the first half of his report.<sup>142</sup>

**VI. MR. BOEDEKER FAILED TO FOLLOW BASIC BEST PRACTICES FOR DESIGNING SURVEYS FOR LITIGATION, WHICH COULD HAVE ALLOWED HIM TO IDENTIFY THE MAJOR DESIGN FLAWS IN BOTH OF HIS STUDIES**

**A. Mr. Boedeker did not conduct a proper pretest of either of his studies**

90. Some of the major design flaws I described in Sections III and IV above in both Mr.

Boedeker's "Pre-Test" and conjoint survey could have been avoided or alleviated. Mr.

Boedeker could have taken the opportunity to learn about respondents' understanding and perception of the terms, attributes, and choices presented in both his surveys through a proper pretest, which is an important and standard procedure for designing surveys, especially in litigation.

91. Guidelines for survey design and administration emphasize the importance of conducting a

pretest. A pretest, as defined by Dr. Shari Diamond in her *Reference Guide on Survey*

*Research*, is the administration of the survey to a small sample of the target population in

which "interviewers observe the respondents for any difficulties they may have with the

questions and probe for the source of any such difficulties so that the questions can be

rephrased if confusion or other difficulties arise."<sup>143</sup> Properly conducted pretests can inform

the design of the ultimate survey instrument and help to identify potential flaws in the survey

design.

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<sup>142</sup> See Boedeker Report, Section 2.

<sup>143</sup> Diamond, at p. 389.

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92. Mr. Boedeker conducted an exploratory survey that he called a “Pre-Test,” which has nothing in common with a proper pretest except for the name. His “Pre-Test” survey did not allow him to observe difficulties respondents may have while taking the survey and did not provide feedback for his survey design. In fact, it is unclear whether Mr. Boedeker is aware of what a true pretest is, as he conflates it with a number of other types of studies, stating that “[t]he proper design of a survey requires [...] [c]onduct[ing] a pre-test/pilot or perform research to obtain information from a sample of consumers about their preferences and which product attributes they perceive as important.”<sup>144</sup> A pretest should be a trial run of the ultimate survey and methodology the researcher intends to use, where an interviewer can observe respondents and probe respondents about any difficulties. Mr. Boedeker’s “Pre-Test” survey, however, is based on a completely different methodology and therefore cannot be used to determine whether or not respondents found the language in his conjoint survey confusing, the choice tasks burdensome, or any other number of potential issues. In fact, given the confusing nature of Mr. Boedeker’s “Pre-Test,” which I discussed in Section III, Mr. Boedeker should have conducted a true pretest of that first study to properly evaluate consumer preferences. Further, if Mr. Boedeker had conducted a pretest of his conjoint survey, during which he administered his conjoint survey to a small sample of respondents and allowed them to raise any issues or concerns while taking the survey and probed for any issues, he may have avoided some of the fatal mistakes in his conjoint survey design.

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<sup>144</sup> Boedeker Report, ¶ 80.



**B. Mr. Boedeker did not follow other basic best practices for designing surveys for litigation**

93. In addition to failing to pretest his survey, Mr. Boedeker does not adhere to several other survey-design best practices. Most notably, both Mr. Boedeker's "Pre-Test" survey and his conjoint survey likely primed respondents to answer subsequent questions in a certain way. Priming is the mechanism by which exposure to certain stimuli, words, or phrases influences how respondents perceive or react to subsequent questions.<sup>145</sup> In Mr. Boedeker's "deflector" questions prior to the choice task, which he claimed to be "unrelated to this case,"<sup>146</sup> Mr. Boedeker asked "How much do you agree with the following statements," "I'm always looking for new ideas to improve my home," "I would buy eco-friendly products if they were less expensive," and "Technology is moving so fast, I don't even bother to try and keep up."<sup>147</sup> These statements likely primed respondents, making concepts such as eco-friendliness, improving the home, and technology more easily accessible to respondents when they entered the conjoint task. As a result, respondents likely put more emphasis on the lifetime attributes in their choice screens, as an LED light bulb's lifetime and cost savings over that lifetime are likely to be associated with the concepts of eco-friendliness, improving one's home, and technology.
94. In addition to priming respondents, Mr. Boedeker fails to use balanced, non-leading language in these "deflector" questions. Specifically, he emphasizes "agree" over "disagree" and

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<sup>145</sup> See Higgins, E.T., W.S. Rholes, and C.R. Jones, "Category Accessibility and Impression Formation," *Journal of Experimental Social Psychology*, Vol. 13, 1977, pp. 141-154, at p. 141. This study found that respondents exposed to either positive or negative trait terms prior to viewing a person, respondents' subsequent characterizations and evaluations of the person reflected the traits they were exposed to prior to viewing the person.

<sup>146</sup> Boedeker Report, ¶ 116.

<sup>147</sup> "LED Conjoint Survey.docx."

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suggests to respondents that they *agree* with the provided statements.<sup>148</sup> A more balanced, non-leading approach would be to ask respondents, “How much do you agree or disagree with the following statements?”

95. These questions also likely suffer from yea-saying bias, which is the tendency of respondents to agree with whatever statement is put in front of them and has long been part of the survey research lexicon.<sup>149</sup> Survey researchers often convert one-sided questions to two-sided questions in order to balance the questions and minimize any such biases. This approach has been part of the mainstream for almost 70 years now. Payne (1951) wrote:

“Sometimes the questioner assumes that the negative side of the question is so obvious that it need not be stated. He may simply ask:

Do you think most manufacturing companies that lay off workers during slack periods could arrange things to avoid layoffs and give steady work right through the year?

63% said companies could avoid layoffs, 22% said they couldn't, and 15% had no opinion.

The alternative here seems to be so implicit in the question that it need not be stated. Either companies could avoid layoffs— or they couldn't. No other interpretation seems possible. But what happens when we take the trouble to state the alternative to another carefully matched cross section of respondents?

Do you think that most manufacturing companies that lay off workers during slack periods could avoid layoffs and provide steady work right through the year, or do you think layoffs are unavoidable?

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<sup>148</sup> “LED Conjoint Survey.docx.”

<sup>149</sup> Arndt, J. and E. Crane, “Response Bias, Yea-Saying, and the Double Negative,” *Journal of Marketing Research*, Vol. 12, No. 2, 1975, pp. 218-220.

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35% said companies could avoid layoffs, 41% said layoffs are unavoidable, and 24% expressed no choice.”<sup>150</sup>

96. When the question was balanced, the percentage of people who agreed with the proposition implicit in the question stem declined by 28 percentage points. As academic research has cautioned survey designers regarding the phenomenon of unbalanced questions, it is unclear why Mr. Boedeker’s survey has not adopted this basic concept.

## **VII. CONCLUSION**

97. My work on this assignment has led me to the following conclusions:

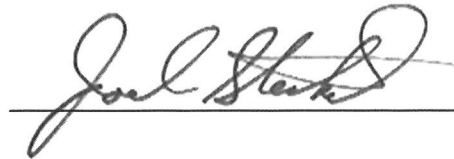
- 1) Mr. Boedeker’s exploratory “Pre-Test” survey is fraught with fundamental problems that yield invalid, irrelevant, and biased data.
- 2) Mr. Boedeker’s flawed and biased conjoint survey design cannot yield valid results.
- 3) Beyond the problematic design of his conjoint survey, Mr. Boedeker’s analyses of his conjoint data are not in line with academically accepted methodologies and are conceptually and technically flawed.
- 4) Mr. Boedeker failed to follow basic best practices for designing surveys for litigation.

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<sup>150</sup> Payne, at pp. 7-8.

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98. Given these severe errors, Mr. Boedeker cannot reliably “assess consumers’ changes in choices and preferences to quantify the economic loss to consumers.”<sup>151</sup>

A handwritten signature in black ink, reading "Joel Steckel", is written over a horizontal line.

Joel H. Steckel

March 22, 2019

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<sup>151</sup> Boedeker Report, ¶ 14.

**Exhibit 1**  
**Inconsistencies within Choice Screens of Mr. Boedeker's Conjoint Survey**

<b>Type of Inconsistency</b>	<b>Respondents (n = 1,000) Exposed to Inconsistencies</b>	
	<b>Number of Respondents</b>	<b>Percentage of Respondents</b>
Cheapest Bulb Cannot Be Superior to "Cheap Bulbs" <sup>[1]</sup>	509	50.9%
A Bulb with the Claim Does Not Last Six Times Longer <sup>[2]</sup>	744	74.4%
Multiple Bulbs with the Claim Have Different Lifetimes and Cannot All Last "Six Times Longer" <sup>[3]</sup>	1,000	100.0%
<b>Respondents Exposed to At Least One Inconsistency</b>	<b>1,000</b>	<b>100.0%</b>

<b>Type of Inconsistency</b>	<b>Choice Screens (n = 12,000) Containing Inconsistencies</b>	
	<b>Number of Choice Screens</b>	<b>Percentage of Choice Screens</b>
Cheapest Bulb Cannot Be Superior to "Cheap Bulbs" <sup>[1]</sup>	750	6.3%
A Bulb with the Claim Does Not Last Six Times Longer <sup>[2]</sup>	1,222	10.2%
Multiple Bulbs with the Claim Have Different Lifetimes and Cannot All Last "Six Times Longer" <sup>[3]</sup>	8,447	70.4%
<b>Choice Screens Containing One Inconsistency<sup>[4]</sup></b>	<b>10,419</b>	<b>86.8%</b>

**Notes:**

- [1] The cheapest bulb is the only one with the claim "will last six times longer than cheap LED light bulbs" — even though it is already the cheapest LED light bulb shown. This inconsistency occurs when exactly one of the five bulbs carries the comparative lifetime claim and is the lowest-priced bulb.
- [2] Relative to the cheapest bulb in the choice set, a bulb with the claim "will last six times longer than cheap LED light bulbs" does not actually last six times longer based on the number of years stated in the lifetime attribute. This inconsistency can occur when exactly one of the five bulbs carries the comparative lifetime claim and is not the lowest-priced bulb.
- [3] If the comparative lifetime claim appears two or more times among the five products shown and the lifetimes of these options are not the same, then the choice set contains inconsistencies.
- [4] Only one of the three types of inconsistencies described is possible within any choice screen.
- [5] This table is not exhaustive of all of the inconsistencies in Mr. Boedeker's choice screens. Only three especially prominent inconsistencies are shown.

**Sources:**

- [1] LEDdesign010819.csv.  
 [2] CBC60Watt011519.csv.  
 [3] CBC100Watt011519.csv.

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**APPENDIX A**  
**CURRICULUM VITAE**

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**EDUCATION**

**UNIVERSITY OF PENNSYLVANIA, THE WHARTON SCHOOL**

Doctor of Philosophy Degree (Marketing/Statistics) awarded, May 1982.  
Dissertation Title: "A Game Theoretic and Experimental Approach to the Group Choice Phenomenon in Organizational Buying Behavior;" Professor Yoram Wind, advisor.

Master of Arts Degree (Statistics) awarded May 1980.

Master of Business Administration Degree (Management Science) awarded with Distinction, May 1979.

Elected to Beta Gamma Sigma, May 1979.

**COLUMBIA UNIVERSITY**

Bachelor of Arts (Mathematics) awarded Summa Cum Laude, May 1977.

Elected to Phi Beta Kappa, May 1977.

**ACADEMIC POSITIONS**

Vice Dean for Doctoral Education, Stern School of Business, New York University, August 2012-Present.

Accounting Department, Acting Chairperson, Stern School of Business, August 2016 – Present.

Director PhD Programs, Stern School of Business, New York University, May 2007-July 2012.

Marketing Department Chairperson, Stern School of Business, New York University, July 1998-June 2004.

Professor and Associate Professor, Stern School of Business, New York University, January 1989 - present. Taught courses in Business Strategy, Marketing Management, Marketing Research, Corporate Reputation and Branding, Models of Pricing and Promotion, Field Studies in the New Economy, Marketing Engineering, and Analytic Marketing for Management Consulting. Also taught Doctoral Seminars in Mathematical Models in Marketing and Research Methods.

Visiting Professor, Wharton School, University of Pennsylvania, January 1995 - December 1995. Taught Core Marketing course.

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Visiting Professor, Escola de Pós-Graduação em Ciências Económicas e Empresariais, Universidade Católica Portuguesa, May - June 1992, May - June 1993. Taught Industrial Marketing and Marketing Strategy.

Associate Professor and Assistant Professor, Graduate School of Business, Columbia University, July 1981 - December 1988. Taught MBA-level courses in Industrial Marketing, Marketing Planning, and Marketing Research. Taught three Ph.D.-level Marketing Seminars and Applied Multivariate Statistics.

Visiting Associate Professor, School of Organization and Management, Yale University, September - December 1988. Taught graduate course in Marketing Strategy.

Visiting Assistant and Associate Professor, Graduate School of Management, University of California at Los Angeles, July 1984 - June 1985, January - March 1987. Taught Advanced Marketing Management, Marketing Research, and Strategic Marketing Planning.

Assistant Instructor, Department of Statistics, University of Pennsylvania, July 1979 - June 1980. Assisted in undergraduate and MBA-level courses in Statistics. Taught undergraduate course in Calculus.

Teaching Assistant, Department of Mathematics, Columbia University, September 1976 - May 1977. Assisted in courses in Number Theory and Differential Equations.

## **PROFESSIONAL INTERESTS**

Marketing Strategy and Marketing Research. In particular, marketing research methodology, marketing and branding strategies, electronic commerce, approaches for one-to-one marketing, and managerial decision making.

## **PUBLICATIONS**

### **Books**

Shift Ahead: How the Best Companies Stay Relevant in a Changing World (with A. Adamson), New York: AMACOM, 2018.

Marketing Research (with D. Lehmann and S. Gupta), Boston: Addison-Wesley Longman, 1998.

Analysis for Strategic Marketing (with V. Rao), Boston: Addison-Wesley Longman, 1998.

The New Science of Marketing: State of the Art Tools for Anticipating and Tracking the Market Forces that will Shape Your Company's Future (with V. Rao), Chicago: Irwin Professional Publishers, 1995.



*Confidential***Journal Articles**

“Testing for Trademark Dilution in the Court and Lab,” (with B. Beebe, R. Germano, and C. Sprigman, University of Chicago Law Review, Vol 86, 2019 (Forthcoming).

“The Future of Marketing Letters,” (with P. Golder and S. Jap), Marketing Letters, Vol. 29, No. 3, September, 2017, 1-5.

“Behavioral Reasons for New Product Failure: Does Overconfidence Induce Over-forecasts?” (with D. Markovitch, A/ Michaut-Denizeau, D. Philip, and W. M. Tracy), Journal of Product Innovation Management, Vol. 32, No. 5, September 2015.

“Modeling Credit Card Share of Wallet: Solving the Incomplete Information Problem,” (with Y. Chen), Journal of Marketing Research, Vol. 49, No. 5, October 2012.

“The Role of Consumer Surveys in Trademark Infringement: Evidence From the Federal Courts,” (with R. Bird), University of Pennsylvania Journal of Business Law, Vol. 14, Issue 4, Summer 2012, 1013-1054.

“Do Initial Stock Price Reactions Provide a Good Measurement Stick for Marketing Strategies? The Case of Major New Product Introductions in the US” (with D. Markovich), European Journal of Marketing, Vol. 46, Iss. 3, 2012, 406-421.

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“Choice and the Internet: From Clickstream to Research Stream,” (with R. Bucklin, J. Lattin, A. Ansari, S. Gupta, D. Bell, E. Coupey, J.D.C. Little, C. Mela, and A. Montgomery), Marketing Letters, Vol. 13, No. 3, Summer 2002.

“A Multiple Ideal Point Model: Capturing Multiple Preference Effects from within an Ideal Point Framework,” (with J. Lee and K. Sudhir), Journal of Marketing Research, Vol. 39, No. 1, February 2002.

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“2001: A Marketing Odyssey,” (with E. Brody), Vol. 20, No. 4, Marketing Science, Fall 2001.

"Consumer Strategies for Purchasing Assortments within a Single Product Class," (with Jack K.H. Lee), Journal of Retailing, Vol. 75, No. 3, Fall 1999.

“The Max-Min-Min Principle of Product Differentiation,” (with A. Ansari and N. Economides), Journal of Regional Science, May 1998.

“Dynamic Influences on Individual Choice Behavior,” (with R. Meyer, T. Erdem, F. Feinberg, I. Gilboa, W. Hutchinson, A. Krishna, S. Lippman, C. Mela, A. Pazgal, and D. Prelic), Marketing Letters, Vol. 8, No. 3, July 1997.

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“Selecting, Evaluating, and Updating Prospects in Direct Mail Marketing,” (with V. Rao), Journal of Direct Marketing, Vol. 9, No. 2, Spring 1995.

“A Cross-Cultural Analysis of Price Responses to Environmental Changes,” (with V. Rao), Marketing Letters, Vol. 6, No. 1, January 1995.

“Cross Validating Regression Models in Marketing Research,” (with W. Vanhonacker), Marketing Science, Vol. 12, No. 4, Fall 1993.

“Preference Aggregation and Repeat Buying in Households,” (with S. Gupta), Marketing Letters, Vol. 4, No. 4, October 1993.

“Roles in the NBA: There's Still Always Room for a Big Man, But His Role Has Changed” (with A. Ghosh), Interfaces, Vol. 23, No. 4, July-August 1993.

“Introduction to ‘Contributions of Panel and Point of Sale Data to Retailing Theory and Practice’,” Journal of Retailing, Vol. 68, No.3, Fall 1992.

“Explanations for Successful and Unsuccessful Marketing Decisions: The Decision Maker’s Perspective” (with M.T. Curren and V.S. Folkes), Journal of Marketing, Vol. 56, No. 2, April 1992.

“Locally Rational Decision Making: The Distracting Effect of Information on Managerial Performance” (with R. Glazer and R. Winer), Management Science, Vol. 38, No. 2, February 1992.

“Prospects and Problems in Modeling Group Decisions” (with K.P. Corfman, D.J. Curry, S. Gupta, and J. Shanteau), Marketing Letters, Vol. 2, No. 3, July 1991.

“A Stochastic Multidimensional Scaling Methodology for the Empirical Determination of Convex Indifference Curves in Consumer Preference/Choice Analysis” (with W.S. DeSarbo and K. Jedidi), Psychometrika, Vol. 56, No. 2, June 1991.

“A Polarization Model for Describing Group Preferences” (with V. Rao), Journal of Consumer Research, Vol. 18, No. 1, June 1991.

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“On the Creation of Acceptable Conjoint Analysis Experimental Designs,” (with W.S. DeSarbo and V. Mahajan), Decision Sciences, Vol. 22, No. 2, Spring 1991.

“Longitudinal Patterns of Group Decisions: An Exploratory Analysis” (with K.P. Corfman and D.R. Lehmann), Multivariate Behavioral Research, Vol. 25, No. 3, July 1990.

“Investing in the Stock Market: Statistical Pooling of Individual Preference Judgments,” (with N. Capon), Annals of Operations Research, Vol. 23, 1990.

“Judgmental Forecasts of Key Marketing Variables: Rational vs. Adaptive Expectations” (with R. Glazer and R. Winer), International Journal of Forecasting, Vol. 6, No. 3, July 1990.

“Committee Decision Making in Organizations: An Experimental Test of the Core,” Decision Sciences, Vol. 21, No. 1, Winter 1990.

“Towards a New Way to Measure Power: Applying Conjoint Analysis to Group Purchase Decisions” (with J. O’Shaughnessy), Marketing Letters, Vol. 1, No. 1, December 1989.

“The Formation and Use of Key Marketing Variable Expectations and their Impact on Firm Performance: Some Experimental Evidence” (with R. Glazer and R. Winer), Marketing Science, Vol. 8, No. 1, Winter 1989.

“A Heterogeneous Conditional Logit Model of Choice” (with W. Vanhonacker), Journal of Business and Economic Statistics, Vol. 6, No. 3, July 1988.

“Estimating Probabilistic Choice Models from Sparse Data: A Method and an Application to Groups” (with D.R. Lehmann and K. Corfman), Psychological Bulletin, Vol. 95, No. 1, January 1988.

“A Friction Model for Describing and Forecasting Price Changes” (with W.S. DeSarbo, V.R. Rao, Y.J. Wind and R. Colombo), Marketing Science, Vol. 6, No. 4, Fall 1987.

“Group Process and Decision Performance in a Simulated Marketing Environment” (with R. Glazer and R. Winer), Journal of Business Research, Vol. 15, No. 6, December 1987.

“Effective Advertising in Industrial Supplier Directories” (with D.R. Lehmann), Industrial Marketing Management, Vol. 15, No. 2, April 1985.

### **Book Chapters**

“The Inevitable Decline of American Political Discourse,” in Review of Marketing Research, Vol. 17, D. Iacobucci (ed.), Emerald Publishing, 2019.

“Dynamic Decision Making in Marketing Channels”, with S. Gupta, and A. Banerji, in Experimental Business Research, A. Rapoport and R. Zwick (eds.), Boston, MA: Kluwer Academic Publishers, 2002.

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“PIONEER: Decision Support for Industrial Product Planning” in Efficiency and Effectiveness in Marketing, Proceedings of the American Marketing Association Educator's Conference, Vol. 54, 1988, G.L. Frazier and C.A. Ingene, eds., Chicago.

“Mathematical Approaches to the Study of Power: A Critical Review” in Advances in Consumer Research, Vol. XII, 1985, E. Hirschman and M. Holbrook, eds., Provo, UT.

“On Obtaining Measures from Ranks” in An Assessment of Marketing Thought and Practice, Proceedings of the American Marketing Association Educator's Conference, Vol. 48, B.J. Walker, ed., 1982, Chicago.

**Other**

“How Smart Marketers Gauge the Future to Shift Ahead of Consumer Needs” (with A. Adamson), American Management Association Playbook, December 18, 2017, <http://playbook.amanet.org/training-articles-marketers-shift-ahead-consumer-needs/>

“Paul Green: The Hulk Hogan of Marketing,” essay in the Legends of Marketing Series.

“Jerry Wind A Man Ahead of His Time,” essay in the Legends of Marketing Series.

“Forecasting Online Shopping,” Stern Business, Fall/Winter 2000, pp. 22-27.

“Method to Their Madness,” The Industry Standard, August 7, 2000.

Book review of The Application of Regression Analysis by D.R. Wittink, Journal of Marketing Research, Vol. 26, No. 4, November 1989.

Co-author (with many others) of The Statistics Problem Solver, Research and Education Association, New York, 1978.

**CONFERENCE PRESENTATIONS**

“Testing for Trademark Dilution in the Court and Lab,” (with B. Beebe, R. Germano, and C. Sprigman), Munich Summer Institute, June 2018.

“Trademark Dilution: Searching for the Elusive Unicorn,” Conference on Empirical Legal Studies, Cornell University, October 2017.

“Measuring Trademark Dilution”, Conference on Empirical Analysis of Intellectual Property, NYU Law School, October 2014.

“Using Surveys in Intellectual Property Cases: What’s the Damage,” AIPLA Spring Meeting, May 2013, Seattle WA.

“Trademark Dilution: An Elusive Concept in the Law,” Conference on Brands and Branding in Law, Accounting, and Marketing Kanan Flagler School, University of North Carolina, April 2012

*Confidential*

"The Role of Consumer Surveys in Trademark Infringement Cases: Evidence from the Federal Courts," (with R. Bird), AMA Summer Educator's Conference, August 2010, Boston.

"Global Market Share Dynamics: Winners and Losers in a Tumultuous World," (with P. Golder and S. Chang), INFORMS Marketing Science Conference, June 2010, Cologne, Germany.

"Use and Abuse of Consumer Perception Research in Antitrust and Advertising Cases," ABA Antitrust Section Spring Meeting, March 2009, Washington, DC.

"New Product Development: The Stock Market as Crystal Ball," (with D. Markovich), INFORMS Marketing Science Conference, Atlanta, GA., June 2005.

"Modeling Credit Card Usage Behavior: Where is my VISA and Should I Use It?," (with Y. Chen), INFORMS Marketing Science Conference, College Park, Md., June 2003.

"Using Capital Markets as Market Intelligence: Evidence from the Pharmaceutical Industry," (with D. Markovich and B. Yeung), INFORMS Marketing Science Conference, College Park, Md., June 2003.

"Using Capital Markets as Market Intelligence: Evidence from the Pharmaceutical Industry," (with D. Markovich and B. Yeung), Share Price Accuracy and Transition Economies Conference, U. of Mich. Law School, Ann Arbor, Mi., May 2003.

"Modeling Internet Site Visit Behavior," (with E. Bradlow and O. Sak), Joint Statistical Meetings, Indianapolis, August 2000.

"Consumer Strategies for Purchasing Assortments within a Single Product Class," (with Jack K.H. Lee), INFORMS Fall Conference, Philadelphia, November 1999.

"When Do Purchase Intentions Predict Sales?" (with V. Morwitz and A. Gupta), AMA Advanced Research Techniques Forum, Santa Fe, NM, June 1999.

"Modeling New Product Preannouncements as a Signaling Game," (with H. Jung), University of Mainz Conference on Competition in Marketing, Germany, June 1999.

"A Multiple Idea Point Model: Capturing Multiple Preference Effects from within an Ideal Point Framework," (with J. Lee), Joint Statistical Meetings, Dallas, TX, Aug. 1998.

"Modeling New Product Preannouncements as a Signaling Game," (with H. Jung), INFORMS Marketing Science Conference, Fontainebleau, France, July 1998.

"Dynamic Decision-Making in Marketing Channels: Traditional Systems, Quick Response, and POS Information," (with S. Gupta and A. Banerji), NYU Conference on Managerial Cognition, May 1998.

"When Do Purchase Intentions Predict Sales?" (with V. Morwitz and A. Gupta), INFORMS International Meetings, Barcelona, July 1997.

"Mental Models in Competitive Decision Making: A Blessing and A Curse," Conference on Competitive Decision Making, Charleston, SC, June 1997.

*Confidential*

“When Do Purchase Intentions Predict Sales?” (with V. Morwitz and A. Gupta), INFORMS Marketing Science Conference, Berkeley, March 1997.

“Model Adequacy versus Model Comparison: Is the ‘Best’ Model Any ‘Good’?, ” (with A. Ansari and P. Manchanda), INFORMS Marketing Science Conference, Berkeley, March 1997.

“Dynamic Decision-Making in Marketing Channels: Traditional Systems, Quick Response, and POS Information,” (with S. Gupta and A. Banerji), First Conference in Retailing and Service Sciences, Banff, 1994.

“Dynamic Decision-Making in Marketing Channels: Traditional Systems, Quick Response, and POS Information,” (with S. Gupta and A. Banerji), Behavioral Decision Research in Management Conference, Boston, 1994.

“Modeling Consideration Set Formation: The Role of Uncertainty,” (with B. Buchanan and S. Sen), TIMS Marketing Science Conference, Tucson, 1994.

“A Cross-Cultural Analysis of Price Conjectures to Environmental Changes,” (with V. Rao), TIMS Marketing Science Conference, St. Louis, 1993.

“Decision-Making in a Dynamic Distribution Channel Environment,” (with S. Gupta and A. Banerji), TIMS Marketing Science Conference, St. Louis, 1993.

“Cross Validating Regression Models in Marketing Research,” (with W. Vanhonacker), TIMS Marketing Science Conference, London, 1992.

“The Influence of Stock Price on Marketing Strategy,” (with D. Gautschi and D. Sabavala), TIMS Marketing Science Conference, Wilmington, DE, 1991.

“A Polarization Model for Describing Group Preferences” (with V. Rao), ORSA/TIMS National Fall Meetings, Philadelphia, 1990.

“A Polarization Model for Describing Group Preference,” (with V. Rao), Behavioral Decision Research in Management Conference, Philadelphia, 1990.

“Conflict Resolution and Repeat Buying” (with S. Gupta), TIMS Marketing Science Conference, Champaign, Ill., 1990.

“Variety Seeking at the Group Level” (with S. Gupta), Association for Consumer Research Fall Meetings, New Orleans, 1989.

“On Using Attraction Models to Allocate Resources in a Competitive Environment,” TIMS Marketing Science Conference, Durham, NC, 1989.

“Multidimensional Scaling with Convex Preferences” (with W.S. DeSarbo), ORSA/TIMS National Fall Meetings, St. Louis, 1987.

“A Social Comparison Model for Describing Group Preference Evaluations” (with V. Rao), TIMS Marketing Science Conference, Jouy-en-Josas, France, 1987.

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“The Day the Earth Stood Still,” Association for Consumer Research Fall Meetings, Toronto, 1986.

“A Friction Model for Describing and Forecasting Price Movements” (with W. DeSarbo, V. Rao, Y. Wind, and R. Colombo), ORSA/TIMS National Fall Meetings, Miami Beach, 1986.

“An Eigenvalue Method for Measuring Consumer Preferences” (with E. Greenleaf and R. Stinerock), TIMS Marketing Science Conference, Dallas, 1986.

“Creating Conjoint Analysis Experimental Designs without Infeasible Stimuli” (with W. DeSarbo and V. Mahajan), TIMS Marketing Science Conference, Dallas, 1986.

“The Mediating Role of Information in Marketing Managers' Decisions” (with R. Glazer and R. Winer), TIMS Marketing Science Conference, Dallas, 1986.

“Incorporating Interdependencies of Utility Functions into Models of Bargaining” (with S. Gupta), ORSA/TIMS National Fall Meetings, Atlanta, 1985.

“The Formation of Key Marketing Variable Expectations” (with R. Glazer and R. Winer), ORSA/TIMS National Fall Meetings, Atlanta, 1985.

“Does the Nash Equilibrium Really Describe Competitive Behavior?: The Case of Cigarette Advertising,” TIMS Marketing Science Conference, Nashville, 1985.

“A Heterogeneous Conditional Logit Model of Choice” (with W. Vanhonacker), ORSA/TIMS National Fall Meetings, Dallas, 1984.

“Using a ‘Robust’ Response Function to Allocate Resources in a Competitive Environment,” TIMS Marketing Science Conference, Chicago, 1984.

“Longitudinal Models of Group Choice Behavior,” (with D. Lehmann and K. Corfman), ORSA/TIMS National Fall Meetings, Orlando, 1983.

“Considerations of Optimal Design of New Task Industrial Products,” ORSA/TIMS National Fall Meetings, San Diego, 1982.

“Game Theoretic Choice Models in Organizational Buying Behavior,” TIMS Special Interest Conference in Marketing Measurement and Analysis, Philadelphia, 1982.

### **OTHER RESEARCH IN PROGRESS**

Trademark Dilution: In Search of the Unicorn (with B. Beebe, R. Germano, and C. Sprigman)

Measuring Likelihood of Confusion (with B. Beebe, R. Germano, and C. Sprigman)

Marketing Research in the Courtroom vs. the Boardroom: What are the Differences and Do They Matter? (with R. Bird)

The Impact of Trademark Litigation Outcomes on Brand Equity and Marketing Decision Making (with R. Bird)



*Confidential*

Modeling the Tradeoffs between Marketing Research and Flexible Manufacturing.

### **INVITED SEMINARS**

Columbia University	Spring 1991, Summer 1994
Cornell University	Fall 1983, Spring 1989
Georgetown University	Fall 2006
Pennsylvania State University	Fall 1996, Fall 2006
Rutgers University	Spring 1994
Temple University	Fall 1995
University of California, Berkeley	Spring 1990
University of California, Los Angeles	Spring 1985, Spring 1996
University of California, San Diego	Fall 2003
University of Florida	Spring 1992
University of Mainz, Germany	Summer 1998
University of Michigan	Spring 1993
University of Pennsylvania	Spring 1992, Spring 1995, Spring 1998
University of Southern California	Spring 1987
Washington University, St. Louis	Spring 2003

### **EDITORIAL SERVICE**

#### **Editorships**

Co-Editor, *Marketing Letters*, July 2010 – March 2017

Guest editor, special section of Marketing Science on the history of marketing science theory and practice, 2001.

Consulting editor in marketing, Addison-Wesley Longman Academic Publishers, Boston, MA, 1993-1999.

Guest editor, special issue of Journal of Retailing on the use of panel and point of sale data, 1992.

#### **Other**

Member of Editorial Board (current), Journal of Retailing.

Have served on editorial board or as ad-hoc referee for Journal of Marketing, Journal of Marketing Research, Management Science, Marketing Science, Journal of Consumer Research, Journal of Retailing and Consumer Services, Manufacturing and Service Operations Management, Decision Sciences, Journal of Business and Economic Statistics, Journal of Econometrics, Strategic Information Systems, Review of Marketing Science, Corporate Reputation Review, and Journal of Business Research.



*Confidential***SERVICE****Dissertation Committees Chaired**

Joseph Pancras (co-chair)	(Marketing - New York University)
Sergio Meza (co-chair)	(Marketing – New York University)
Dmitri Markovich	(Marketing – New York University)
Heonsoo Jung	(Marketing - New York University)
Jack Lee	(Marketing - New York University)
Asim Ansari (co-chair)	(Marketing - New York University)
Shahana Sen (co-chair)	(Marketing - New York University)

**Dissertation Committees Served on**

Tingting Fan (Marketing – New York University)  
 Kei-Wei Huang (Information Systems – New York University)  
 Sherrif Nassir (Marketing – New York University)  
 Jane Gu (Marketing – New York University)  
 Orkun Sak (Marketing – University of Pennsylvania)  
 Atanu Sinha (Marketing - New York University)  
 Louis Choi (Marketing - Columbia University)  
 Sunder Narayanan (Marketing - Columbia University)  
 Carol Rhodes (Ed. Psych. - Columbia University)  
 Rita Wheat (Marketing - Columbia University)  
 Robert Stinerock (Marketing - Columbia University)  
 Bruce Buchanan (Business Economics - Columbia University)  
 Chen Young Chang (Marketing - University of Pennsylvania)

**Other Discipline Related Service**

Chairperson, Marketing Committee, INFORMS, January 2006 – June 2010.  
 Past President, INFORMS Society on Marketing Science, January 2004 – December 2005.  
 Founding President, INFORMS Society on Marketing Science, January 2003 – December 2003.  
 President, INFORMS College on Marketing, January 2002 – December 2002.  
 President Elect, INFORMS College on Marketing, January 2000- December 2001.  
 Secretary-Treasurer, INFORMS College on Marketing, January 1998-December 1999.  
 Association of Consumer Research, Annual Program Committee, 1999.  
 Co-Organizer of 1996 Conference on Consumer Choice and Decision Making, Arden House, Harriman, New York, June 1996.  
 Organized Marketing Sessions at Fall 1989 TIMS/ORSA Joint National Meetings, New York, October 1989.

**Other University Related Service**

Member, Research Resources Committee, Stern School of Business, September 2009 – Present.

*Confidential*

Chair, Statistical and Quantitative Reasoning Task Force, Stern School of Business, September 2005 – August 2007.

Member, Specialization Committee, Stern School of Business, September 2004 - Present.

Member, PhD Oversight Committee, Stern School of Business, January 2006 – May 2007.

Member, Executive Committee, Digital Economy Initiative, Stern School of Business, January 2000 – August 2002.

Member, Board of Directors, Center for Information Intensive Organizations, Stern School of Business, September 1998 – December 1999.

Member of MBA Committee, Stern School of Business, New York University, 1989-December 1998. Committee was responsible for supervising redesign of MBA programs in 1991 and 1995, Chairman September 1997-August 1998.

Member of Stern MBA Curriculum Review Committee, September 1997-December 1998. Committee redesigned MBA Core.

Member of Stern School Committee on Improving Consulting Activities, July 1998-December 1998.

Member of Building Committee, Stern School of Business, New York University, 1990-1992.

Member of Research Committee, Stern School of Business, New York University, 1990-1991.

Elected member of Columbia University Senate. Served on Budget Review and Alumni Relations Committees, 1986-1988.

## **AWARDS**

Awarded the J. Parker Bursk Memorial Prize as the outstanding student participating in the Department of Statistics, University of Pennsylvania, 1979.

Dissertation was awarded Honorable Mention in the 1982 American Marketing Association Dissertation Competition.

Dissertation was named Winner of the 1983 Academy of Marketing Science Dissertation Competition.

Invited speaker at the J. Parker Bursk Memorial Prize Luncheon, Department of Statistics, University of Pennsylvania, 1992.

Invited speaker at American Marketing Association Doctoral Consortium, University of Southern California, 1999.

Cited for outstanding editorial support, Fordham University Pricing Center, Sept. 2002.

*Confidential*

Named one of the inaugural winners of the Best Reviewer Award for the *Journal of Retailing*, 2003.

Work recognized by West publishing as one of the outstanding 2012 law review articles on Intellectual Property.

Work recognized with the Highly Commended Paper Award at the Literati Network Awards for Excellence 2013.

### **SELECTED CONSULTING AND OTHER PROFESSIONAL ACTIVITIES**

AOL MovieFone, Inc., New York, NY. Performed general consulting on analyzing caller data for telephone movie information service; Consulted as expert in conjunction with damage assessment in legal proceedings.

Citicorp, New York, NY. Built choice model for bank services. Gave lectures on Marketing Strategy to CitiCards executives.

Directions for Decisions, Inc., New York, NY and Jersey City, NJ. Consulted on segmentation study of sports apparel market, designed and implemented "Construction Test", a concept design decision tool. Performed general consulting on marketing research practice on an ongoing basis.

eComplaints.com, New York, NY. Member board of advisors.

Federal Trade Commission, Washington, D.C. Served as consultant on branding strategies in antitrust investigation.

J.C. Penney Co., New York, NY. Performed sales-advertising response analysis. Work was done on request for Management Decision Systems, Inc., Weston, MA.

The Open Center, New York, NY. Consulted on marketing strategy and direct marketing practices.

Pfizer Pharmaceuticals, New York, NY. Conducted seminar on conjoint analysis.

SilverBills, Inc., New York, NY. Member board of advisors.

Union Carbide Corporation, Danbury CT, Built econometric model to forecast prices .

Various Expert Witness Engagements. Clients include AOL Moviefone, AT&T, Avon, Brother International, Dyson, Epson, Hershey's, BM, JP Morgan Chase, Gerber Products, Johnson & Johnson, K-Swiss, Mead Johnson, Microsoft, Monster Cable, McDonald's, New Balance, Playtex, PNC Financial, Proctor & Gamble, Roche, Seagate, Sergio Garcia, Sharp, TiVo, Under Armour, Wal-Mart, Warnaco, and various plaintiffs in consumer class actions.

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**MEMBERSHIPS**

American Marketing Association

American Statistical Association

Association for Consumer Research

The Institute for Operations Research and Management Science (INFORMS)

Society for Consumer Psychology

American Association for Public Opinion Research

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**APPENDIX B**  
**TESTIMONY IN THE LAST FOUR YEARS**

### **Testimony in the Last Four Years**

#### **Depositions**

People of the State of California vs. Overstock.com, Inc., Case No. RG10-546833. Superior Court of California, (County of Alameda).

Denimafia, Inc. v. New Balance Athletic Shoe, Inc., Foot Locker, Inc., The Sports Authority, Inc., and Famous Horse, Inc., d/b/a V.I.M., Civil Action No. 12-cv-04112 (AJP), United States District Court (Southern District of New York).

Moroccanoil, Inc. v. Marc Anthony Cosmetics, Inc., Case No. CV 13-02747 DMG (ARGx), United States District Court (Central District of California, Western Division).

QS Wholesale, Inc. and Quiksilver, Inc. v. Rox Volleyball, Inc. and 1<sup>st</sup> Place Team Sales, Inc., Case No. SACV 13-00512 AG (JPRx), United States District Court (Central District of California, Southern Division).

Church & Dwight Co., Inc. v. SPD Swiss Precision Diagnostics GmbH, Civil Action No.: 14-CV-585 (AJN), United States District Court (Southern District of New York)

Twentieth Century Fox, et al. v. Empire Distribution, Inc. Case No: 2:15-cv-02158-PA-FFM (United States District Court for the Central District of California).

United States of America, ex rel., Floyd Landis vs. Tailwind Sports Corporation et. al., Case No. No. 1:10-cv-00976 (CRC); United States District Court (District of Columbia)

Art Cohen, Individually and on Behalf of All Others Similarly Situated, v. Donald J. Trump, Case No. 13-CV-2519-GPC(WVG), United States District Court (Southern District of California)

Kenneth Hobbs on behalf of himself and all others similarly situated, v. Brother International and Does 1 through 10 inclusive, Case No. 2:15-cv-01866-PSG (MRWx), United States District Court, (Central District of California)

Mizner Court Holdings, LLC, and San Marco Holdings, LLC, v. Country Club Maintenance Association, Inc., d/b/a Broken Sound Master Association, Case No. 15-CA-000864 (AB), Circuit Court of the 15<sup>th</sup> Judicial Circuit in and for Palm Beach County.

Wasser, Joshua, Ila Gold, and Roberto Israel Barajas-Ramos, on behalf of themselves and all others similarly situated, vs. All Market Inc., Case No.: 16-cv-21238- Scola/Otazo-Reyes, United States District Court (Southern District of Florida, Miami Division).

Car-Freshener Corporation and Julius Samann Ltd. vs. American Covers, LLC F/K/A American Covers, Inc. D/B/A Handstands, Energizer Holdings, Inc., and Energizer Brands, LLC, Civil Action No.: 5:17-cv-171 (TJM/ATB), United States District Court (Northern District of New York).

*Confidential*

Spangler Candy Company vs. Tootsie Roll Industries, LLC, Case No. 3:18-cv-1146, United States District Court (Northern District of Ohio, Western Division - Toledo).

Merck & Co., Inc. and Merck Sharp & Dohme Corp., v. Merck KGaA, Case No. 2:16-cv-00266-ES-MAH, United States District Court (District of New Jersey).

### **Trial**

People of the State of California vs. Overstock.com, Inc., Case No. RG10-546833. Superior Court of California, (County of Alameda).

Church & Dwight Co., Inc. v. SPD Swiss Precision Diagnostics GmbH, Civil Action No.: 14-CV-585 (AJN), United States District Court (Southern District of New York).

Dayna Craft (withdrawn), Deborah Larsen, Wendi Alper-Pressman, Individually and On Behalf of All Others Similarly Situated v. Philip Morris Companies, Inc., a corporation, and Philip Morris Incorporated, a corporation, Case No. 2202-00406-02 , Division No. 6 (Missouri Circuit Court, Twenty-Second Judicial Circuit, City of St. Louis)

### **Hearing**

In the Matter of Distribution of the 2010, 2011, 2012, 2013 Cable Royalty Funds, (Before the Copyright Royalty Judges, Washington D.C.) Docket No. 14-CRB-0010-CD (2010-13)

### **Daubert Hearing**

Visteon Technologies, LLC. v. Garmin International, Inc., Civil Action No. 2:10-cv-10578-PDB-MAR (United States District Court, Eastern District of Michigan – Southern Division)

### **Preliminary Injunction Hearing**

Danone US, LLC. v. Chobani, LLC., Case Action No. 18 CV 11702 (United States District Court, Southern District of New York)

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**APPENDIX C**  
**MATERIALS RELIED UPON**



**Case Documents**

Amended Class Action Complaint, *Jeff Young, individually and on behalf of all others similarly suited, v. Cree Inc.*, Civil Action No. 4:17-cv-06252-YGR, United States District Court, Northern District of California, San Francisco Division, April 30, 2018.

**Expert Reports**

Expert Report of Stefan Boedeker In Support of Plaintiff's Motion for Class Certification, *Jeff Young, individually and on behalf of all others similarly suited, v. Cree Inc.*, Civil Action No. 4:17-cv-06252-YGR, United States District Court, Northern District of California, San Francisco Division, January 18, 2019, and available backup.

**Depositions**

Deposition of Stefan Boedeker, *Jeff Young, individually and on behalf of all others similarly suited, v. Cree Inc.*, Civil Action No. 4:17-cv-06252-YGR, United States District Court, Northern District of California, Oakland Division, March 12, 2019.

**Academic Articles and Books**

Allenby, G.M., J. Brazell, J.R. Howell, and P.E. Rossi, "Economic Valuation of Product Features" (working paper), October 2013, available at [https://aede.osu.edu/sites/aede/files/imce/files/Seminars/Economic\\_Valuation\\_of\\_Product\\_Features\\_100813.pdf](https://aede.osu.edu/sites/aede/files/imce/files/Seminars/Economic_Valuation_of_Product_Features_100813.pdf).

Arndt, J. and E. Crane, "Response Bias, Yea-Saying, and the Double Negative," *Journal of Marketing Research*, Vol. 12, No. 2, 1975, pp. 218-220.

Cohen, J., "A Power Primer," *Psychological Bulletin*, Vol. 112, No. 1, 1992, pp. 155-159.

Diamond, S.S., "Reference Guide on Survey Research," *Reference Manual on Scientific Evidence*, 3<sup>rd</sup> Edition, National Academies Press, 2011, pp. 359-423.

Green, P.E. and V. Srinivasan, "Conjoint Analysis in Consumer Research: Issues and Outlook," *Journal of Consumer Research*, Vol. 5, No. 2, 1978, pp. 103-123.

Higgins, E.T., W.S. Rholes, and C.R. Jones, "Category Accessibility and Impression Formation," *Journal of Experimental Social Psychology*, Vol. 13, 1977, pp. 141-154.

Holbrook, A.L., M.C. Green, and J.A. Krosnick, "Telephone Versus Face-to-Face Interviewing of National Probability Samples with Long Questionnaires: Comparisons of Respondent Satisficing and Social Desirability Response Bias," *Public Opinion Quarterly*, Vol. 67, 2003, pp. 79-125.

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Huber, J. and J. McCann, "The Impact of Inferential Beliefs on Product Evaluations," *Journal of Marketing Research*, Vol. 19, No. 3, 1982, pp. 324-333.

Jacoby, J., "Are Close-Ended Questions Leading Questions?," *Trademark and Deceptive Advertising Surveys: Law, Science, and Design*, Diamond, S.S. and Swann, J.B. (Eds.), American Bar Association, Section of Intellectual Property Law, 2012, pp. 261-284.

Johnson, R.M., "Understanding HB: An Intuitive Approach," *Sawtooth Software Research Paper Series*, 2000.

Kivetz, R. and I. Simonson, "The Effects of Incomplete Information on Consumer Choice," *Journal of Marketing Research*, Vol. 37, No. 4, 2000, pp. 427-448.

Krosnick, J.A. and S. Presser, "Question and Questionnaire Design," *Handbook of Survey Research*, 2<sup>nd</sup> Edition, Wright, J.D. and P.V. Marsden (Eds.), Emerald Group Publishing Limited, 2010, pp. 263-313.

Lehmann, D.R., S. Gupta, and J.H. Steckel, *Marketing Research*, Addison Wesley Educational Publishers Inc., 1998.

Meyer, R.J., "A Model of Multiattribute Judgments under Attribute Uncertainty and Informational Constraint," *Journal of Marketing Research*, Vol. 18, No. 4, 1981, pp. 428-441.

Orme, B.K., "Assessing the Monetary Value of Attribute Levels with Conjoint Analysis: Warnings and Suggestions," *Sawtooth Software Research Paper Series*, 2001.

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